1stEd

1508505672

UNIVERSITY OF BRISTOL.

Medical Library.

Sept. 1938.

SHELF 4

D.A.

Digitized by the Internet Archive
in 2015

https://archive.org/details/b21440190

AN HISTORICAL ACCOUNT
OF THE
MEDICINAL WATERS,
OR
MINERAL SPRINGS,
OF
DAVIESVILLE, AT BURNHAM,
NEAR BRIDGWATER:

TO WHICH ARE SUBJOINED,
A COPIOUS ANALYSIS OF THEIR COMPONENT PARTS; AN ENUMERATION AND DESCRIPTION OF THE DISEASES IN WHICH THEY ARE MORE PARTICULARLY SERVICEABLE;
AND SUITABLE
DIRECTIONS FOR THE GUIDANCE OF INVALIDS,
BEFORE AND DURING A COURSE OF THEM.

BY GEORGE HENNING, M.D.
Late one of the Physicians of the Taunton and Somerset County Hospital, and Author of "The Critical Inquiry into the Pathology of Scrofula," &c. &c.

Quis deus hanc, musæ, quis nobis extudit artem?
Unde nova ingressus hominum experientia cepit?
Georgicor. L. iv. v. 315-16.

BRIDGWATER:
GEORGE AWBREY, FORE STREET.

1836.

GEORGE AWBREY, PRINTER,
BRIDGWATER.

UNIVERSITY OF BRISTOL
MEDICAL
LIBRARY

37135

PREFACE.

The Daviesville Spas, having already acquired great celebrity in the district where they were discovered, it is thought proper to make them more generally known; and it is with this view that the following report of them is submitted to the public, in the hope that by these means the sphere of their utility may be more extensively enlarged.

The circumstance of the propinquity of these waters to the sea, an occurrence so very unusual as to be regarded as unique, and peculiar to this spot, cannot fail to be considered by every competent judge as of very great importance; since the combination of the atmosphere of the ocean with the exhibition of the mineral waters, is, in every point of view, a great and substantial advantage in the treatment of all the diseases that are proper for a watering place.

To this very circumstance, however, which I now assume, and state to be so advantageous, an objection naturally presented itself to the minds of many unprejudiced persons, among whom I candidly include myself, and to others who were not wholly free from prejudice, namely, that these springs were mere filtrations of the sea, to which, in regard to the intervenient space, they almost approximate, and in point of taste have no very remote similitude.

This delusion was, however, but of very short duration; and its futility was promptly demonstrated by the unequivocal evidence of certain well known chemical tests, which showed with how many medicinal ingredients the spas were enriched; of which, with the exception of one only, namely the muriate of soda, the water of the sea was destitute. Another fact, if further proof were needful, of great practical weight in establishing the disparity of the mineral and the marine water, is the inferiority of the latter in its action on the human body. So that it appears to me that the question is set at rest.

Though mineral waters are so frequently met with, that there is scarcely any district of country without one or more of them, yet the number of cold medicinal springs which have attained much reputation is comparatively few. This fact is the more remarkable, as the constituent parts of all are so nearly allied in number as well as kind, that they vary chiefly, and often times only, in the relative proportion of the ingredients to each other. From hence it has resulted, that according to the predominance of any one active ingredient, not only has the spa been denominated, but its characteristic in the treatment of disease has been assigned.

In speaking, and even writing respecting mineral waters, and especially such as have recently been discovered, it is still a custom so to eulogize them, and their alleged virtues, as if somewhat mysterious and preternatural were resident in the wells which contain them, and as if each new spring outstripped all its forerunners. Now the usual result of this injudicious course is, that the undeservedly high repute, into which ordinary waters are thus exalted, is speedily followed by disappointment, and neglect. The only true criterion of the estimation in which any mineral water is entitled to be held, is its efficacy in the removal of diseases possessing some similarity of character; as, for example, the water at Aix la Chapelle, and at Barege, both of which are thermal springs, have their action chiefly on the vessels on the surface of the body, whether used as baths, or drank as alteratives. Of both these waters the temperature is very high ; that of the royal bath at Barege, which is the hottest of the four, being 122° F., while that of Aix is 143° F. and to this temperature alone much, perhaps, of their utility may be ascribed. These waters, therefore, abounding as they do with sulphurated hydrogen gas, are very properly resorted to by patients afflicted with cutaneous maladies, and are with equal propriety termed sulphureous.

Thus chalybeate waters, which give momentum to the pulse, elasticity to the muscular tissues, appetite to the stomach, strength to the digestion, and vigour to the whole animal fabric, are well entitled to the term of tonics, or strengtheners. This property, being possessed by one of the spas at Daviesville, in combination with laxative, and other ingredients, admits of its being designated both tonic and aperient ; both these seemingly opposite properties being resident in it in a very desirable, and efficient degree. If this spa were to be classed with any other of the most celebrated mineral waters, it would be most suitably arranged with those which are called saline. Of these the most eminent are those of Seidlitz, Cheltenham, Plombieres, and Leamington; that of Cheltenham alone containing the chalybeate impregnation.

Thus again, the waters containing some of the characteristics of a sulphureous impregnation, which is most adapted to give relief to certain morbid states of the surface of the body, are not improperly called alterative, because they possess a more penetrating influence, and extend their action over the whole minute vascular structure. Waters of this description are with sufficient propriety called sulphureous, although, as may be seen in the body of the work, they contain sulphur rather in its principle, than in substance. Such is the case with the second of the Daviesville Spas, and it would admit of being classed with the waters of Harrogate, and Moffat, of Aix la Chapelle, and Enghein, though it must be owned that the sulphureous impregnation is possessed by these in a superior degree.

But by raising the temperature of the sulphureous spa at Daviesville to a parity with that of Barege, or Aix, and also by imparting to it the sulphureous principle in an increased degree, it undoubtedly may be made equal to those very celebrated springs in point of medicinal efficiency. For doing this every arrangement has been made in the most judicious manner at Daviesville; so that individuals, having occasion for the use of sulphureous waters as remedies of inveterate cutaneous affections, may on trial find this spa quite commensurate with their wishes.

In other complaints where the psychrolusia alone is required, it may be had in apartments, in all respects convenient and comfortable, and either in the form of the shower, or the plunging bath, and of spring water, or that of the sea, warm or cold.

To these remarks I will only add, that after the very full attention which I have given to the consideration of the substances said to be found by chemical re-agents in different mineral waters, I feel compelled to express my strong doubts, whether so exact a knowledge of them, as to be *omni exceptione major*, be obtainable by the process of evaporation, and testing the result.

In thus expressing myself, I desire to be understood as speaking less as a chemist, than as a physician. As a chemist, I might prevail on myself to be contented with the evidence afforded by tests, processes, and calculations; forgetful, perhaps, that the destruction of one body, may be the generation of a new and different compound; forgetting also, that a similar result is not always obtained by different chemists employing the like processes.

But as a physician, accustomed to prescribe the waters in certain quantities, with the view of producing determinate results on the human body, I am constrained to say that it is scarcely within the verge of possibility to procure these results, by administering the customary doses of such articles as the chemical analysis would exhibit as being exclusively present.

I am, therefore, led to the inference that mineral waters in their natural state are otherwise medicated than the researches of chemistry confirm; and though I may and do regard and appreciate the science of chemistry on other occasions, yet on the present I fear the satirical distich may not be wholly inapplicable :

"*Agnoscat chimicus vanæ mendacia famæ;*
"*Nec totam ulterius medicinam quærat in igne.*"

Perhaps in justly estimating the advantages afforded by mineral springs, certain collateral circumstances deserve to be taken into the account, which hitherto have had too little stress laid on them. These, having been adverted to by an elegant and accomplished writer of our own faculty,* shall here be inserted in his own language :—

---

* *Opuscula Medica*, GEORGII BAKER, M.D.

"*Nec ullus sane dubitandi est locus, quin in eos omnes aquarum mineralium fontes, ad quos tanta frequentia ubique gentium confugit quicquid fere invalidorum est atque æguotantium, a locorum amœnitate, et a jucundo vitæ victusque consortio, quadam saltem ex parte, derivetur virtus. Ibi enim animus discit quasi seipsum fugere; et ab ærumnis, curisque suis, ad res extra positas, et ad varia voluptatum lenocinia convertitur. Qui enim in se sæpius altiusque, quam par est, descendit, certo certius aut inveniet mala, aut faciet: et præter quas ipsa vita secum afferat, miserias addet, qui iis, quas afferat, nimis anxius immoratur.*"

Which may be thus freely translated :—

Nor, indeed, is there any room to doubt, but that of all the various mineral springs, to which the sick and infirm of all nations repair with such great frequency, some part at least of their good effects must be attributed to the amenity of the place, the remission from domestic cares, and the regulation of the habits of life. By these the mind learns to escape, as it were, from itself, and is withdrawn from its distractions by the contemplation of external objects, and the allurements of pleasure. For the man who penetrates into himself more deeply, and with more intensity than was designed by his Creator, will rarely fail to produce unhappiness, even though he should discover no cause for it; and in addition to the calamities with which human life is naturally associated, will generate others of greater magnitude and harder to be borne,—inauspicious care, and unceasing anxiety.

TABLE OF CONTENTS.

CHAPTER I.

PAGE.

Of the Village of Burnham—its extent, population and relative situation, and the advantages which it presents to the public as a Watering Place 1

CHAPTER II.

Of Simple Water, its source and varieties; and of Mineral Waters, and their different impregnations 20

CHAPTER III.

Of the Mineral Waters of Burnham, when, and in what manner they were discovered, and of the component parts of each of them as ascertained and demonstrated by Chemical Analysis 33

CHAPTER IV.

Remarks on the constituent parts of the Tonic Aperient Spa, as demonstrated in the preceding Analysis 57

CHAPTER V.

PAGE.

Of the various forms of Disease to which the Tonic Aperient Spa is more particularly adapted 64

CHAPTER VI.

Of such morbid affections of the Stomach as are likely to be relieved by the use of the Tonic Aperient Spa 67

CHAPTER VII.

Of such morbid states of the Liver as are likely to be relieved by the Tonic Aperient Spa, and first of acute inflammation .. 73

CHAPTER VIII.

Of chronic inflammation of the Liver, and the great advantages likely to accrue from a judicious use of the Tonic Aperient Spa, in conjunction with appropriate medical treatment 77

CHAPTER IX.

Of a torpid state of the circulation in the Liver, inducing permanent organic disease, and the utility of the Tonic Aperient Spa in averting it 81

CHAPTER X.

PAGE.
Of Bilious Diseases, and the great utility of the Tonic Aperient Spa in the treatment of them 85

CHAPTER XI.

Of some affections of the Pancreas, the Spleen, and the Kidneys, and the aid afforded in the treatment of them by the Tonic Aperient Spa 95

CHAPTER XII.

Of the various forms of Disease to which the Sulphureous Spring is more particularly adapted 104

CHAPTER XIII.

Of the Sulphureous Spring used as a Bath, and the Diseases in particular which require its use 111

CHAPTER XIV.

Miscellaneous Observations 114

AN HISTORICAL ACCOUNT
OF
THE MINERAL SPRINGS
OF
DAVIESVILLE, AT BURNHAM.

CHAPTER I.

Of the Village of Burnham—its extent, population and relative situation, and the advantages which it presents to the public as a Watering Place.

The Bay of Bridgwater is an estuary of the Atlantic Ocean, which, twice in twenty-four hours, flows freely into it, and rises occasionally at spring tides, especially when the wind sets in strong from the north-west by west, full forty feet, the water being abundantly saline, and, on the subsidence of the sand, remarkably clear, and quite free from impurities.

The Village of Burnham so closely adjoins this Bay, that it is only disunited from it by the vast and surprising heaps of sand, the accumulation of many ages, which the sea had cast and abandoned on the shore, and the breezes had drifted to their present situation; thus forming, though an adventitious, a natural, stupendous, and effectual bulwark for the land, against the irruption of the tides.

The maintenance of these invaluable barriers, against the very elements which reared them, by which the sea is thus bounded and restrained, and the lands and houses are guarded from inundations, has been immemorially an object of just importance to the government, and of anxious solicitude to the owners and occupiers of the neighbouring lands; and accordingly no measures suggested by observation, and sanctioned by experience, have been omitted for their preservation.

Of these measures the most efficacious consist of strong works of timber, or of masonry, singly or in combination, at the foot of the sand-hills, where the sands have slidden or escaped, or are in danger of being undermined by the waves, and washed away. This species of defence against the sea, of whatever materials it may be constructed, is usually called the "Sea-Wall," and is not only employed to fortify the sand-hills when they stand in need of it, but also to protect the banks of such rivers from sliding, as are subjected to the rapid entry of the tides.

These means of defence, however, have reference only to the invasion of the sea. There is yet another element to which the sand-hills are equally opposed, and against which they of themselves can make no effectual resistance. I mean the air. For being by their elevation, as well as their relative situation, continually exposed to the influence of the winds, they from their dryness, looseness and levity, are apt to be blown away, and thrown on the inclosures, to the great detriment of the produce of the soil, and the still greater inconvenience and annoyance of the community. In this manner sand, to the depth of several feet, is not unfrequently whirled or wafted away in the space of a single night.

To counteract this injury, as far as was practicable, it was found expedient to cultivate, as it were, these barren sand-hills, and to plant them with a species of rush, called in the northern counties "Starr," or "Bent," but with us Sedge, or Sea-mat-weed; it readily vegetates, and prospers in this unpromising soil, and not only maintains itself by its vigorous roots against the impetuosity of the tempest, but fixes and binds the sands.

This humble plant, *arundo humilis*, thus cursorily introduced to the notice of the reader, has been considered of so much importance on account of its very valuable and, perhaps, peculiar property of cementing, if I may so speak, the fugitive sands, that, in the reign of George the second, an act of parliament was passed for its preservation and maintenance on the north-western coasts of this island, and particularly that of the county of Lancaster; it does not, however, appear ever to have been enforced in this district, although the applicability of its provisions is quite evident and acknowledged.

In passing this act the avowed object of the legislature was to prevent "disorderly people" from cutting, or plucking the sedge, which they were accustomed to do for the purpose of manufacturing it into mats and brushes. The more effectually to deter them from the commission of this offence, not only was a penalty of twenty shillings imposed on each violation of the act, and, in default of payment, three months' imprisonment in the house of correction with hard labour, but a similar punishment was directed to be inflicted on any individual living within five miles of the sand-hills, in whose custody any of the said sedge should be found.

The Parish of Burnham is of considerable extent, its circumference being variously estimated at from eight to twelve miles, while its surface ranges over four thousand acres of a rich and fertile soil. At the last census its population was found to exceed twelve hundred persons. On seventy individuals it confers the elective franchise for the eastern division of this large county. It may be subdivided into the following hamlets, namely:—Highbridge, Middle Burnham, Edithmead, Paradise, Westown, Watchfield, and Wallrow; to which may now properly be added that of Daviesville, which appears among the rest

velut inter ignes
Luna minores.

The Village of Burnham, which designation I use to distinguish it from the parish at large, and to denote that part in particular where the population is most dense and concentrated, has, within the space of a few years, increased much in the number and quality of its buildings. It still increases, though more slowly than might be expected, when its growing importance as a watering place, and the medical efficacy of the Daviesville Spas are considered. It must, indeed, be acknowledged, that the accommodations are as yet quite insufficient for the convenience and comfort of the visitors who resort to this coast during the genial and cheering months of summer and autumn, to inhale the salutiferous and refreshing breezes of the sea, to invigorate their frames by bathing, exercise, and relaxation from business, and to regain their health, when impaired by indulgence in the pleasures of the table, and inactivity, by the powerful aid of the mineral waters; so that numerous instances have unfortunately occurred, of families, who came late in the season, having been obliged to go to other less eligible places for want of accommodations. It is, however, presumable that additional houses will speedily be erected, as they are so much in request, as so many delightful situations may readily be procured on advantageous terms, and as, from various local and favorable circumstances, the materials for building can be obtained here, at prices unusually moderate.

This part of Burnham is to be regarded as the focus of the parish. Here stands the Church, a substantial and unadorned building, but in such a degree too small for congregational purposes, that it is with great probability estimated, that not one-third of the inhabitants could find standing room during the celebration of divine service on Sundays. It is, therefore, greatly to be desired that the sacred edifice should be enlarged in the most useful, but least expensive way. The addition of an aisle on the north side of the nave, to correspond with that on the opposite side, seems the least objectionable mode of supplying the defect on the part of the permanent inhabitants. But during the season of the year when visitors repair to watering places, it is expedient that some arrangements should be made for their accommodation; and I feel very great pleasure in stating, that the Reverend Mr. Davies has generously offered to erect, at his own expense, a gallery over the entrance door on the south side of the fabric, for their use. This offer, it is hoped, will be received with a feeling corresponding to that with which it was made; but it has not yet, I apprehend, been acceded to. It is, however, so reasonable in itself, that I cannot conceive on what grounds it could be rejected or declined, even on its own merits. But if the merits of the proposer be justly appreciated, any thing like a capricious refusal of his application would be ungracious indeed.

On entering the chancel, the eye of the visitor is struck with delight and admiration at the sight of the magnificent altar-piece, not unmixed with something like disappointment, at seeing so noble a piece of sculpture under such disadvantages of situation, that it was found to be necessary to disunite the structure, and to place the two side compartments in advance of that of the centre, so that its entierty seems broken, and its conformity somewhat doubtful. As a work of art, however, it cannot be too highly commended.

As a pamphlet explanatory of the altar-piece, and accompanied with an engraving of it, and of the church of Burnham, is to be obtained of the sexton at a moderate price, and as the proceeds of the sale are applied to charitable purposes, I shall forbear from giving any description of it. It would, however, be unjust to the memory of the eminent individual, who presented this gift to the church of Burnham, and erected it where it stands, *proprio sumptû*, to omit the elegant and classical inscription, in which his lordship has briefly stated the history of the sculpture, its past and recent dedications to the Almighty, the admirable skill of the artist, and his own affectionate regard for his parishioners. I shall, therefore, transcribe it.

"*Quem mirâ Inigo Iones, elaborabat arte, ut regio sacello sanctissimo decori foret, ad Eccles: Div: Petr: Westmonast: (ita fors tulit) devenit* *marmoreus apparatus. Deinde relegatum (absit invidia verbo) ut Penetralia Petr: incrementis congruentibus instaurarentur, lubens excepit Walker, Epus: Roffen: et hos intra parietes piè erga Deum, et officiosè erga eos, quibus invigilavit XXVII. Ann. Vicarius P. C."*

Which may be thus Englished:—

"Originally designed as an Altar-Piece for a Chapel Royal, these Marbles, which attest the admirable skill of Inigo Jones, were eventually deposited in the Church of St. Peter, Westminster. On being subsequently removed, not out of any disparagement to their merit, but in order to make way for a skreen in unison with the general architecture of the Abbey, they passed into the hands of Walker, Bishop of Rochester, who, out of kind regard to the Parishioners, whose Minister he had been for twenty-seven years, dedicated the gift he had received to the Glory of God within these walls."

In addition to the several benefactions which have been made to this parish, there is one of forty shillings, to be paid annually for ever, for the better support of the Sunday School. This is given by the Reverend David Davies, who has charged his freehold estates in the parish with the payment of it.

Adjoining the Churchyard, on the south side, is the Vicarage House, the summer residence of the Reverend Charles Pulsford, the Vicar, and one of the Canons of the Cathedral Church of Wells. It was enlarged and much improved by the late incumbent, the Bishop of Rochester, who seems to have made it his favourite place of retreat.

On the opposite side of the churchyard, but not attached to it, is the handsome dwelling of the relict of the Bishop, Mrs. King, by whom it was erected.

On the western side of the churchyard, and intervenient to it and the Beach, is the Esplanade, or Terrace, which fronts the hamlet of Daviesville. It extends itself along the coast northward, and is computed to be two hundred yards in length, and thirty in breath. It is extremely gratifying to see the unshapen and chaotic sand-heaps thus transformed, by the combined efforts of taste and industry, into the neatness and elegance of a lawn, and inspires a hope, that an example, so eminently successful, may invite other gentlemen to corresponding exertions.

Mr. Dodd has led the way by building two tasteful houses in, I believe, the cottage style, on the sand-hills, in a line with Daviesville, and about half a mile distant from it northward. They are in the hamlet of Paradise, in a situation admirably adapted to place the distant scenery in the most favourable point of view.

The terrace of Daviesville is bounded and upheld by a sea-wall of masonry of great substance and strength, against which the sea rises at spring tides to a great height, and batters it with a force quite alarming to persons not accustomed to it.

On this terrace stands the original Pharos, or Lighthouse: the great feature of the place, and the cynosure of the waters. It was the erection of this building that raised Burnham from obscurity. It drew strangers to the place, and those of quick perception saw intuitively, that it was a land of promise; that it was at once adapted to afford recreation to the healthy, and refreshment to the invalid; to preserve present health, and restore it when impaired, or lost.

This eminently important, though homely structure, was erected in the first year of the present century, at the sole cost and risk of the Reverend David Davies, at that time the stipendiary curate of Doctor Walker King, prior to his elevation to the see of Rochester.

It is a well known fact that, up to the very time thus referred to, the navigation at the confluence of the Parret and the Brue was extremely dangerous from circumstances relative to shifting sands, called the Gore, and to the want of a beacon. Shipwrecks were frequent, and the lamentable spectacle of human carcasses, floating to the shore, was of ordinary occurrence. The congenial feeling of sympathy and regret was general indeed, but it was unavailing; and it was reserved to Mr. Davies to furnish the preventive to this vast loss of life and property. His active and benevolent mind led him to raise the lighthouse, which taught the benighted and perplexed mariner what to shun, and where to steer his course, and Providence gave a blessing to the undertaking, and ratified it.

Shipwrecks from this cause have since been extremely rare, although the resort of vessels to the port of Bridgwater has increased from six hundred, which was then the average number, to upwards of two thousand sail, which are now computed annually to enter the river Parret. So that if an estimate were to be made of the number of individuals thus rescued from a dreadful death since the lighthouse was erected, by taking as a datum that on an average twenty lives were annually lost, it would result that during the last thirty-five years, seven hundred of our fellow creatures have been preserved. Nor is it unworthy of our consideration that, in addition to the preservation of human life, there has been a corresponding preservation of property to an amount not to be estimated.

Acts such as these elevate individuals of whatever station in society, to the foremost rank of philanthropists, and associate them with those patriots and worthies whom the great Roman Poet has embalmed and immortalized in never dying verse :—

"*Hic manus, ob patriam pugnando volnera passi,*
Quique sacerdotes casti dum vita manebat,
Quique pii vates, et Phœbo digna locuti,
Inventas aut qui vitam excoluere per artes,
Quique sui memores alios fecere merendo."

ÆNEIDOS, L. vi. xv. 660.

"Here Patriots live, who for their countries good,
In fighting fields were prodigal of blood :
Priests of unblemish'd lives here make abode,
And Poets worthy their inspiring God.
And searching wits of more mechanic parts,
Who grac'd their age with new invented arts.
Those who to worth their bounty did extend,
And those who knew that bounty to command."

DRYDEN.

In the year one thousand eight hundred and twenty-nine, the Corporation of the Trinity House being desirous to render the Burnham Light more extensively serviceable, made arrangements with the proprietor for the surrender of his vested interest in it, and thus became possessed of the property. Subsequently they changed the site of the lighthouse, and erected a far more elegant, and much loftier structure, about half a mile northward of the former building, and which, from its greater altitude, as well as from there being no land intervenient to the point of view, must be perceptible at a far greater distance. Some very competent judges have, however, doubted, and are still undetermined, whether the original site was not more happily selected. Moreover, the very circumstance of any change of situation was evidently liable to very strong objections, unless warranted by the most cogent conclusions.

The lamp is made to revolve in the present lighthouse as it did in that which was first constructed, the machinery by which its rotation is effected being the same as before. And with the view of making the discrimination of this from any other light the less liable to mistake, a lesser building with a light has been erected on the shore, in front of the other, far below high water mark. This, taken in juxtaposition with the other, is designed to denote some particular bearings.

The hamlet of Daviesville fronts the sea, and is within thirty yards of it at high water. It commands very pleasing views of the distant, as well as the more contiguous scenery. Of the latter, the small islands called the Steep Holm, and the Flat Holm, are very interesting objects. Though neither of them exceed one mile and a half in circumference, and though they are exposed to the violence of the winds and waves, they have withstood the combined ravages of those elements and time itself, and appear to have undergone no diminution of their original dimensions. The latter of these sister islands, possessing the accommodation of a good inn, is much resorted to in the summer season, and affords recreation for the visitors of Burnham, when they are disposed to make excursions there. For this purpose many pleasure yachts are kept by persons competent to manage them, who are accustomed to sail not only to the preceding islands, but to Newport and Cardiff, to Watchet and Minehead, and to return the same day.

Besides the dwelling houses which comprise the hamlet of Daviesville, is a spacious building, of which one portion has been fitted up with sea water baths, heated as well as cold, and also with hot baths of the sulphureous spring, which are adapted to those individuals who suffer from cutaneous affections. The other parts of the building, which is termed the Bath House, are arranged for the reception and accommodation of such invalids, as may think it expedient, during a course of warm bathing, to avoid all risk from exposure in returning to their residence.

Facing the Bath House is the Machinery for raising the sea water, and conveying it into cisterns for the supply of the cold and warm baths. This arduous enterprise presented many difficulties and much discouragement, and must have been attended with very great expense. Every obstacle has, however, been completely surmounted, and the undertaking has been crowned with well deserved success.

It may not be amiss to mention a most useful, and little to be expected adaptation to the arrangement of this machinery, viz.: cisterns, or beds for the feeding and fattening of oysters. The oysters being in the first instance brought from Wales in suitable quantities, are here deposited, and by occasional changes of their elementary water, with moderate supplies of barley or oats, reduced to the state of meal, they speedily fatten, and become equal in point of quality to the best which are to be had in the London market. As this species of fish is not found on our coast, but is brought from a distance, and too often in an unenjoyable state, the constant supply of them at the customary prices, cannot fail to be a great acquisition to the neighbourhood, and in particular to invalids, to whom it is a nutritious article of diet, and a restorative in emaciating diseases. And here I may be permitted to add, that it is the intention of the Reverend Gentleman, whom I have already had occasion to mention in this chapter, to plant oyster beds in suitable parts of the Bay of Bridgwater, for the purpose of affording additional employment to the fishermen, thus creating a new source for labour; and also to stock the sands of the Gore with a large supply of a very humble shell-fish, the cockle, with a view to the benefit of the poorer classes, who, at low water, will be able to go there from Berrow, on foot.

Burnham is thirty-eight miles distant from Bath, twenty-six from Bristol, sixteen from Glastonbury, nineteen from Taunton, and nine from

Bridgwater. The great Western Road to Exeter and the Land's End passes through the parish, at the distance of about two miles from the village, and in the hamlet of Highbridge, somewhat below which the river Brue disembogues itself into the Bay of Bridgwater. This river has lately been made subservient to a line of canal for barges from Highbridge to Glastonbury, and it is in contemplation to extend it still further south.

Burnham has the great advantage of a Beach, unrivalled in its extent, being seven miles in length, and admirably adapted for every kind of exercise. This peculiarity amply compensates for the deplorable state of the roads in the adjoining parish, which makes this village only accessible from the turnpike road. For as the Berrow road consists of sand alone, it acts as a prohibition to travelling, two horses in harness being inadequate to the duty of one on stoned roads. Indeed all the roads within the parish of Berrow exhibit the dismal appearance of barbarism, never having received the slightest amendment. Surely no such roads are elsewhere to be found, and ought not to be tolerated. If ever roads called aloud for indictment, these are those roads. No plea of justification is offered for this negligence. It is only alleged that the Act allows the choice of materials. But this is a mere evasion. The Act directs that the roads shall be kept in *repair*, and leaves open the material to be employed for the purpose; still, however, making it imperative and absolute, that the roads shall be kept in good and sufficient repair; which with sand, and sand alone, is impossible. It is, therefore, to be hoped that, with as little delay as possible, some means will be vigorously adopted to rid the public of this shameful nuisance.

The soil of Burnham, near the coast, is alluvious. Its climate, from the proximity of the sea, is of course liable to great and sudden variations of temperature. The atmosphere, when undisturbed by the winds, is sufficiently soft and mild, but its great characteristic is to brace and invigorate the frame, which quality renders it so peculiarly suitable to those individuals who have been enfeebled by the warm, enervating and relaxing air of populous towns. The most prevalent wind blows from the west. The water in use for domestic purposes, and which is found not many feet below the surface, is light and transparent, yet somewhat adulterated with carbonate of lime. Burnham is rarely visited by epidemic, and is subjected to no endemic diseases. It is well supplied with the usual kinds of meat of good quality, and at moderate prices. Salmon, and other kinds of sea, and river fish, are furnished in great perfection. Poultry also, and wild fowl, with fruits and vegetables are furnished in great abundance.

The Hotel is now about to be re-opened with every convenience; and at Whitburn's Livery Stables, a fly and a Bath chair are kept for the use of the visitors. In the Pump Room is a moderate selection of books for general reading, with a London newspaper. There is a post daily.

For the accommodation of those individuals who may prefer bathing in the sea at high water, suitable machines are kept, with proper attendants.

CHAPTER II.

Of simple water, its source and varities, and of mineral waters and their different impregnations.

Water is in such universal request, not only for appeasing thirst, and diluting the fluids of the human body, but in preparing the aliment by which it is maintained, that it may be considered as the vehicle of all our nourishment. It must, therefore, have at all times been a desideratum to obtain it in as pure a state, that is, as free from adventitious ingredients, as possible. It is, however, rarely, if ever, met with uncontaminated by some foreign impregnation; for whether it descends from the clouds, or is filtered through the earth, it meets with various substances which become dissolved in, suspended by, or incorporated with it; by which, corresponding properties, though scarcely, if at all, evident to the senses, become imparted to it. That water, however, which is colourless, insipid and inodorous, is generally taken to be sufficiently pure and unexceptionable, and well suited to domestic purposes.

Water may be considered as of two distinct kinds, namely: that which descends in the form of rain, dew, snow or hail, and which is called meteoric; and that which flows over the surface of the earth, or is received into its bosom, and is therefore termed terrestrial.

The former of these consists of exhalations from the sea and the earth, rarefied by the heat of the sun into vapour, and again condensed by a lower temperature into its original state. This, though it would seem to be the purest of water, becomes, in its passage through the air, impregnated with those articles which are continually floating in it; such as the invisible and impalpable particles of earth, the eggs of insects, and insects themselves, smoke and exhalations, &c.; so that all water derived from this source is to be considered as vitiated and impure, but in varying degrees according to local circumstances. The latter, or terrestrial, water, is for very obvious reasons still less free from impurities and impregnations, though of a different kind, than the meteoric. For even when resting on, or flowing over the surface, it cannot but be acted on by the subjacent earth; but when penetrating its recesses, which it can reach by slow degrees only, it becomes the menstruum of whatever substances it approaches, if they admit of solution.

Terrestrial waters are therefore divisible into such as are simple and uncombined, and consequently destitute of taste and smell; and those, which are impregnated with some mineral or other ingredient, which imparts to them one, or the other, or both those marks of distinction, and tests, or criteria of purity.

Simple waters are classed into spring, well, river, lake, or those which are stagnant, and are to be considered as more or less pure in the order thus stated; yet there is a great variety in each class, almost every one being differently impregnated in kind, as well as in degree.

The purest spring waters have been found generally to hold suspended, or in solution, about two grains of solid contents in one pint. There are, however, some, though very rare, exceptions to this rule. Doctor Stephen Hales, for example, found in a water at Hampton Court, one grain and a half only in the pint; and Doctor Wall, of Worcester, after evaporating three quarts of the water of Holywell, at Malvern, found no residuum whatever. Doctor Rutty also states, that some waters at Dublin left only one grain, which is less than what rain water leaves.

Those waters which contain about ten grains of solid contents in a pint, are possessed of a laxative property from the saline ingredient; so that the proportion of about ten grains of saline earthy substance to a pint, seems to be nearly the least that entitles a water to be called hard.

Water, the purer it is, is lighter when weighed, and softer to the touch; is sooner heated and cooled, and consequently is more prone to freeze. When water is perfectly pure, a solution of soap in alcohol mixes smoothly with it, and causes not the least turbidness. But if the water be impregnated with an earth, or with a metal, as is the case with most hard waters, the soap is immediately decomposed and curdles. A result equally conclusive is obtained by dropping into any such water a solution of lead in vinegar, such as the liquor *plumbi* of the London Pharmacopeia; on making the experiment, the mixture becomes turbid instantly, and the metalic solution, if any be present, is precipitated.

Water is the proper solvent of all saline bodies, whether acid, alcaline or neutral. It dissolves only a certain quantity of each salt, but after it is fully saturated with one salt, it is still capable of dissolving a certain quantity of another, and, when heated, it dissolves, and keeps suspended a greater quantity of saline substances than when cold.

When water is impregnated with foreign bodies, which impart to it a taste, odour, or any other property, different from such as is possessed by water in the usual state, and especially when it affects the body medicinally, even though it be colourless, inodorous, and insipid, it obtains the designation of a spa, or mineral water.

As such waters are thus impregnated by those substances in their passage through the earth, it is evident that fossils only can enter into the composition of mineral waters, and such only of them as are soluble in water alone, or in water when joined to some saline body, acid, alcaline, or neutral; or when it meets with bodies which are either deprived of air, or are saturated with too large a quantity of it.

Most of the mineral waters hitherto discovered contain sulphuric acid, which has seldom been found disengaged in any water, but generally combined with some alcaline, metallic, or earthy matter, which, in its passage through the earth, it has met with. In some waters this acid seems to be of the fixed kind, but more generally it is found in a more volatile state, or gas, and quickly evaporates.

The muriatic acid, or spirit of sea-salt, has never yet been found pure, but is often met with in combination with fossil alcali, and calcarious earth. Thus combined it occurs in the waters of the sea, as well as in those of saline, and other mineral springs.

Sulphur has long been reputed to be an ingredient in many mineral waters, and all such as are distinguishable by a fetid and peculiar smell, resembling that of a foul gun, a cess-pool, or putrid eggs, have been erroneously considered to be more or less impregnated with native sulphur. This mineral, however, does not exist in any spa in substance, but only as a gas; even the waters of Aix la Chapelle and Harrogate, so highly celebrated, and in such repute for their efficacy in cutaneous affections, owe their celebrity less to their unaccompanied effects, than to the prepossession of their votaries, that brimstone, the sovereign remedy for affections of the skin, without which it is hard to say what would be the condition of mankind, exists in them in a substantial and active form. These prejudices are fast wearing themselves out; and it now rests on the authority of the ablest chemists, that the impregnation of these waters is that of the sulphureous principle only, but in combination with carbonic gas.

Although, therefore, it cannot be affirmed that any mineral water, unless it springs from a burning sulphureous mountain, contains sulphur, dissolved or suspended in, and to be precipitated from it, in the form of brimstone; yet it must be acknowledged that the effect of several such waters on the human body, when taken inwardly, evinces that they contain the sulphureous principle, so far united with them, as to produce results similar to those of a solution of real sulphur. Thus the mineral water of Aix la Chapelle, when drank for the usual time, imparts to the whole body a sulphureous odour, tinges the linen yellow, and, though this be inconclusive, since the same effect is produced by dissimilar means, even tarnishes silver carried in the pocket, making it first yellow, and then black. Moreover, it is well known that it cures the itch, as well as other diseased conditions of the skin, in the same manner as the sulphureous preparations in common use.

A similar inference may be deduced respecting the "Sulphur water," and the "Crescent water," at Harrogate. Both these springs, though of unquestionable efficacy in many morbid states of the surface of the body, are impregnated with sulphur in no other form than that of hepatic, or sulphurated hydrogen gas, of which the former of these waters contains nineteen cubic inches, and the latter thirteen inches and one-sixth.

From hence I might venture to assume that though certain mineral waters contain the principle of sulphur, or sulphurated hydrogen gas, so minutely combined, as to produce effects analogous in many circumstances to those of sulphur in solution, and may, therefore, without impropriety be called sulphureous, yet the actual presence of sulphur can be demonstrated in no other form.

With regard to metallic impregnations, copper and iron are the only true metals that are ever found in mineral waters. Both these, being readily soluble in acids, may be met with in most countries: the former fortunately not often, and only in the vicinity of hills containing the ore of calamine; the latter with great frequency.

Earths of various kinds present themselves to the researches of the chemist in almost every mineral water. In some of these waters they are suspended only, in others chemically combined. Clay, marl, and other argillaceous and crystalized substances, which are not easy of solution in acids, or not affected by them, are, for the most part, only suspended. But the calcareous earths, such as limestone, magnesia, spar, and the like, which are soluble in acids, and reducible to quicklime by the force of fire, are for the most part dissolved.

Alumina, or argillaceous earth, is very rarely, if ever, found to exist in mineral waters; though in the analysis of the mineral water of Nottington, near Weymouth, printed and exhibited in the pump-room at that place, it is said to contain five grains in an imperial gallon. Doctor Rutty, however, found none. Selenite and gypsum, though they seem to be dissolved in many waters, cannot be redissolved in pure water, after being separated from their former combinations.

Such are the different solid substances with which mineral waters have been found to be impregnated. They are, however, seldom to be met with singly, but commonly several of them associate in the same water; yet no water has been known to contain more than ten, and of these ingredients one half at least may be regarded as possessing no salutary property: taken collectively, however, the whole are of great importance in the treatment of diseases.

It is this combination which makes it so difficult to determine with precision the contents of almost any mineral water, and to ascertain with perfect exactness, the proportion of each impregnating principle.

But, in addition to these solid ingredients, are the volatile or spirituous ones termed gases; which are justly considered of the greater importance, as when they have made their escape, the water is deprived of no small part of its efficacy.

These aëriform bodies, I mean such as are usually found in wells of mineral waters, are four in number, for the air of the atmosphere is not to be considered as one, though it exists in every species of water, and forms about an eighteenth part of it. Gas exists in water, either in a state of combination with some other ingredient, or is independent of any combination, and what is called loose. In this latter state, such is its elasticity, that it can scarcely be prevented from escaping, which various circumstances contribute to facilitate and hasten, but especially any alteration in the pressure, or any increase in the temperature of the atmosphere.

The gases, as I have just stated, are four in number, namely—oxygen gas, or pure vital air; carbonic acid gas, or fixed air; sulphurated hydrogen gas, or hepatic air; and azotic, or hydrogen gas, or mephitic air.

The first of these is found in some waters though in an inconsiderable quantity, but not where iron, or hydrogen gas is present. Its properties are to stimulate and exhilirate.

Carbonic acid gas, the product of limestone, exists in almost all waters, some of which contain more than their own bulk of it. It unites, as a weak acid, with the earths and metals.

Sulphurated hydrogen gas is formed by the decomposition of iron and water. It abounds in such springs as are commonly called sulphureous, especially if they are thermal. Water is capable of absorbing this gas in very large proportions, but it gradually separates from the water, and becomes united with an alcaline or earthy base, and thus the hydrosulphuret of lime is found to be the most frequent ingredient of hepatic waters.

Azotic, or nitrogen gas results from the decomposition of animal substances, or atmospheric air. It exists in some springs, particularly those of Buxton and Harrogate, but is so uncombined, as to be incapable of being detained in it.

Next to these are the alcaline substances, which, being not only miscible with water, but soluble in it, are found to exist in all mineral waters, and unite with them by the intervention of carbonic acid, or oxygen.

Soda, or fossil alcali, the product of sea-salt, is generally found in mineral waters, but almost always in union with a mineral acid. In thermal spas it is usually combined with carbonic acid only. When combined with muriatic acid, the product is termed muriate of soda; when with carbonic acid, carbonate of soda; when with sulphuric acid, sulphate of soda.

Ammonia is so rarely met with in mineral waters, that out of twenty of the most celebrated, it occurs only in one; namely that of Toplitz. In one quart of this water there are fifteen grains and a fraction of this alcaline substance, without any of the gases. Its solid contents are otherwise very considerable, there being in the before mentioned quantity of the water 13° 5 of carbonate of soda, 16° 5 of carbonate of lime, 32° 5 of carbonate of iron, 61° 3 of muriate of soda, and 28° 5 of muriate of lime. This is of course a most powerful chalybeate water, indeed beyond all comparison the most powerful that is known, and much too stimulating to be used with safety, except in small, and seldom repeated quantities, and in conjunction with active aperients to control its tendency to affect the head, by determining the blood to the brain. Without this precaution, distressing headachs, comatose affections, and even fatal apoplexy may visit a person, drinking it incautiously, while he considers himself in perfect health.

But the earths as well as the alcalies, which are found in the generality of mineral waters, rarely exist in an uncombined state: they are united with the water through the medium of the acids already mentioned, and the particular acid engaged is the denominator of the compound. This, however, has been more particularly explained before.

CHAPTER III.

Of the Mineral Waters of Burnham, when, and in what manner they were discovered, and of the component parts of each of them, as ascertained and demonstrated by chemical analysis.

From the several circumstances which I have detailed in the first chapter, touching the many advantages which appertain to Burnham as a watering place, in a general way of speaking, and of the predilection of the public for it as such, Mr. Davies was intuitively led to institute a comparison between the structure and composition of the earth of Daviesville, and of that of Cheltenham; and having informed himself that many points of strong resemblance, though not of absolute similarity, subsisted between them, he at once resolved to sink a well, for the express and sole purpose of ascertaining whether the correspondence extended to the recesses of the earth, and, if so, whether the subterraneous water might not be of a similar character and quality; confident in his own mind that his undertaking would not be altogether unsuccessful, and encouraged by the cheering and animating hope, that if he should succeed, he might happily render a substantial benefit to the future, as well as the present generation.

With these benevolent views he commenced the work, and took the judicious precaution to direct that notes should be taken of the soil, through the whole extent of the excavation.

First of all sand, to the depth of eight feet, presented itself, which it was necessary to remove to a considerable distance on account of its tendency to slide in, and obstruct the work, and of the large quantities of water which had filtered through the sand, and were either intermixed with it, or had passed through it, resting on the subjacent clay. This water is usually called "land springs," but is in reality the meteoric water, which from sand having no affinity for it, had either percolated the sand, or was intermixed with it.

In the next place, the workmen came to a black greasy loam, not exceeding five feet in depth; they then met with about two inches of "quicksand," running in veins. Clay of excessive hardness when dug, but softening by exposure to the air, next occurred, extending to the depth of twenty-five feet. This substance, it was conjectured, might in process of time have hardened into "blue lias." Lastly, about twenty-six feet of a bluish clay were dug through. This, when first exposed to the air, was of a very soft consistence, but with great rapidity became dry and indurated, retaining without cracking any form into which it was moulded, and at the expiration of seven months becoming neither sonorous nor friable.

Of this substance half a drachm, in fine powder, was stirred into an ounce and a half of common vinegar. A brisk effervescence came on almost immediately, and for thirty minutes continued without intermission, then becoming more and more feeble till it ceased. On being agitated afresh, the effervescence was renewed, and continued for ten minutes, though with less vigour than before; showing that such particles of the substance as had escaped the action of the menstruum were now exposed to its agency.

The gas, thus plentifully evolved, was carbonic acid, or the acid of chalk, and the earth which afforded it was calcareous.

With the view of ascertaining whether any ferruginous impregnation existed in this earth, four grains of *pulvis gallæ* were united by agitation with the preceeding mixture, but no change of colour ensued; on making the further addition of ten drops of the muriated tincture of iron, a deep black was struck instantly; a result which would have been produced, though in an inferior degree, had iron existed in the earth.

The workmen, having thus penetrated to the depth of about seventy-five feet, arrived at the spring, which proved to be a mineral water, possessing active medicinal properties, but fortunately contained in a vehicle not repugnant to the most fastidious palate.

In the progress of the work much water burst in from the side of the well, which seemed to proceed from a spring at no great distance. This water, being received in a glass and examined, was found to possess mineral properties, but dissimilar to the sight, and taste, as well as odour, from that at the bottom of the well. It was at once evident that it was medicinal, and, from its peculiar smell, it was judged to be sulphureous, and of no inferior value to the other. Mr. Davies, therefore, thought it expedient to sink another well of less depth, and at a short distance from the first, and having descended twenty-five feet, the workmen found the spring which was in request.

It now became a desideratum to have the waters analyzed by a scientific chemist, familiarly versed in such pursuits, and it was determined to send a requisite quantity of each for that purpose to Messrs. Corbyn, the druggists, of London, who submitted them to Mr. H. Potter, their chemist, from whom the following statement was received.

ANALYSIS OF THE SALINE WATER.

SS. 1. *External qualities of the water.*

No opportunity was afforded for making any remarks as to the situation of the spring, as to the appearances presented by the water when it was first drawn, or the effects of the atmosphere on such water, or the action of tests.

Its specific gravity when it reached me was 1.009. 72° F. water being 1000. at 60° F.

It was not perfectly colourless, having a very slight yellow tint, owing, doubtless, to vegetable extractive matter.

It was not transparent, for, when the bottle containing it was shaken, it became very turbid, evidently produced by the mixing up an insoluble drab coloured powder, which had been precipitated from the water, it having lost much of the aërial solvent, which had kept this powder in solution.

It possessed no odour, but a very saline taste, unmixed, however, with any degree of bitterness. When filtered, it became perfectly transparent; the same filtered water, when heated in a glass flask over a spirit lamp, lost its transparency, and a very small quantity of a drab coloured powder subsided.

As the boiling progressed, a saline film formed at the surface.

SS. 2. *General effect produced by the action of chemical tests.*

Experiment 1.—Litmus paper was not changed.

Exp. 2.—Turmeric paper was not affected.

Exp. 3.—Solution of soap produced a slight curdy separation, more abundant in the unboiled, than in the water which had been boiled and filtered.

Exp. 4.—Prussiate of potash:—this re-agent produced no effect, not even after the water had been concentrated to one-twentieth of its bulk by evaporation; but when the *turbid* water was used, in conjunction with a little nitric acid, the prussian alcali was immediately affected.

Exp. 5.—Pure ammonia occasioned a flocculent whitish precipitate, less in water that had been boiled. This precipitate, in both instances, was not dissolved by boiling with caustic potash.

Exp. 6.—Oxalate of ammonia occasioned a very slight disturbance in the unboiled water; and none whatever in that which had been briskly boiled for a quarter of an hour.

Exp. 7.—Muriate of barytes produced a small white precipitate, insoluble in muriatic acid.

Exp. 8.—Nitrate of silver gave a white, very copious, curdy precipitate, insoluble in nitric acid, but very soluble in ammonia.

Exp. 9.—Sulphuric acid slightly effervesced; no precipitation, no odour with water that had been boiled, no effervescence with water could be perceived.

Exp. 10.—Barytes produced a white precipitate, insoluble in muriatic acid.

Exp. 11.—Sulphuric acid was added to some of the water highly concentrated, and, when boiling, a filament of gold leaf was introduced, which did not dissolve.

Exp. 12.—Muriate of platina was added to some of the water, concentrated by evaporation to about one-twentieth of its volume, but no precipitate was produced.

Exp. 13.—A portion of the water was boiled with some caustic potash; no smell of ammonia was made sensible, nor did a rod moistened with muriatic or nitric acid cause any dense vapour.

SS. 3. *Inferences drawn from the preceding experiments.*

From the high specific gravity, and strong saline taste, a considerable quantity of solid contents was to be expected. From the boiling in the flask it was to be inferred that there was earthy matter present, and that the matter was dissolved by a volatile agent; also that muriate of soda was to be expected,

From experiment 1, that there was no free acid. Yet there is no doubt that free carbonic acid existed in the water, *fresh drawn,* in considerable quantity.

From experiment 2, that there was no free alcali, nor alcaline earth.

From experiment 3, that there was an *earth* combined, probably with a fixed and aërial acid.

From experiment 4, that iron was present, but in very small quantity, and that this iron was not in combination with a fixed acid, but that it exists as carbonate of iron, held in solution in the spring by the free carbonic acid, in the same way as the carbonated earth and silica.

From experiment 5, the presence of magnesia was inferred combined, with carbonic acid, and a fixed acid. The same experiment rendered it extremely probable that no alumina was to be expected.

From experiment 6, lime in combination with a volatile acid, but not a fixed acid.

From experiment 7, sulphuric acid, in small quantity, as sulphate.

From experiment 8, abundance of muriatic acid in combination.

From experiment 9, the presence of carbonic acid, but no hepatic gas or compound ; no alcaline carbonate.

From experiment 10, the same result as from the seventh experiment.

From experiment 11, no nitric combination.

From experiment 12, no potash was present.

SS. 4. *Evaporation of the water.*

An imperial gallon, taken from the stone bottle immediately after it had been shaken, was poured into a Wedgewood basin, of the quality marked B, the interior surface of which is covered with a perfectly smooth enamel, as hard, and as unalterable as glass itself. The water was evaporated by a gentle heat nearly to dryness, and the residue, dried at the temperature of 160° F., weighed eight hundred and seventy grains, which quantity is equal to one hundred and nine grains in the imperial pint of twenty ounces. This residue was of a drab colour, and did not sensibly attract the humidity of the atmosphere. It was very finely powdered in a Wedgewood mortar, in order to ensure the perfect admixture of the parts, and thus render the whole uniform, so as to obtain corresponding results from different portions of the same residue.

SS. 5. *On the modes of filtration and desiccation adopted in the analysis.*

Nothing can be of greater importance than that the modes of filtration and desiccation shall be the best that the resources of chemistry admit of, as to little variations in this department of manipulation, are to be ascribed most of those discrepancies which we find in the analysis of the same substances, by different scientific chemists. These remarks, of course, apply only to quantitive analysis.

The plan I adopted was to filter the liquid containing the substance whose weight I wished to ascertain, in the state of suspension, through the double filter, formed of two pieces, cut from the same sheet, and exactly counterpoised in a delicate balance.

The two filters, after as much as would had passed through them, were placed in a small conical glass vessel, and heated by the steam of boiling water, so that any substance placed in its apex should be heated to 160° F.

The desiccation was continued, until, by frequent weighing, it was found to have attained its maximum of dryness at that temperature. The two filters were then separated, and each placed in a pan of the balance; the difference between their weights was that of the precipitate. All the quotations of weights, hereafter to be adduced, must be referred to the standard above instituted, namely, dried at 160° F. until it ceased to lose weight, and the weight itself obtained in the manner mentioned.

SS. 6. *Re-dissolution of the solid contents of the water.*

Previous to dissolving any of the saline residue an experiment was made, in order to obtain a comparative estimate between the contents of the water as dried at 160° F. in which case it would retain a considerable portion of water, and the real process as given by calcination, in which operation not only would the remaining water be disengaged, but the extractive matter would also be destroyed.

Experiment.—Twenty grains of the residue, always understanding dried at 160° F., were exposed in platina crucibles, at a low red heat, half an hour: in the commencement of the operation it turned black, owing to the charring of the vegetable matter; this soon burnt off, and the residue became nearly white, which, when weighed, was found to have lost 47 grains. The solid contents of the imperial gallon, dried at red heat, calculated from this experiment, will be 796 grains.

Twenty grains of the residue, dried at 160° F. were submitted to the action of about four ounces of boiling distilled water; and were almost entirely dissolved. A few drops of muriatic acid being now added to the solution, caused a lively effervescence, and the liquid became clear, with the exception of an insoluble substance; this when examined proved to be silex, weighing the tenth of a grain. Of this the solution was attempted by the concentrated mineral acids, but could not be effectuated. It was nearly white and bulky.

Muriatic acid, and muriate of soda.

Twenty grains, part of the same residue, were dissolved in diluted nitric acid; then a sufficient quantity of a solution of nitrate of silver was added to precipitate the whole of the muriatic acid as muriate of silver. This being collected, and washed and dried as usual, was found to weigh 39 grains.

Twenty grains of pure muriate of soda were treated in the same way, and yielded 49 grains of muriate of silver, dried at 160° F. Then

As 49 : 20 : : 39 : 16 nearly.

Thus we have proved that the quantity of muriate of soda contained in 20 grains of residue, is 16 grains, which, according to Dr. Marcet's data, would be 16.6 grains.

Sulphuric acid.

Twenty grains, part of the same residue, were dissolved in diluted nitric acid; muriate of barytes was added in sufficient quantity; the sulphate of barytes obtained, weighed from 1.4 to 1.7 grains.

Sulphate of magnesia. Examination by alcohol.

Twenty grains, part of the same residue, were put into a phial with about 120 grains of alcohol at 812° and frequently shaken, and suffered to remain about two hours. This was then thrown on a filter, the residue washed with a little pure alcohol, and the clear solution evaporated to dryness. It was found that 6.10 grains were dissolved, a considerable portion of which was common salt and vegetable extract. There were traces of sulphuric acid, and magnesia. This alcoholic residue had no deliquescent tendency. It was concluded, therefore, that the alcohol had only taken up a little muriate of soda, and a very minute quantity of sulphate of magnesia. There was no trace of lime.

What the alcohol had not dissolved, was submitted to the action of about four ounces of distilled water. What was not acted upon was dried at 160° F., and weighed 3 grains.

Examination of the 3 grains of insoluble matter.

This was put into a basin, and two or three drops of strong nitric acid were added, and boiled nearly to dryness; this was re-dissolved in water and filtered, and the insoluble portion, dried at 160° F., weighed 0.1 grain of silex.

To the liquor filtered from the silex, muriate of ammonia was added to precipitate the iron, which was collected, and weighed 3.10 grains. With this was a vestige of magnesia, and also some matter, probably vegetable, destructible by red heat. To the liquor, freed from the iron, oxalate of ammonia was added, and a precipitate was obtained, which, when dried and weighed, indicated 0.9 of a grain of carbonate of lime. No magnesia, nor other earth, could be detected in the remaining liquor.

In summing up the preceding results, it was found that there was a deficiency greater than could be accounted for by loss of substance experimented on. It has been previously noticed that a quantity of vegetable extract might be expected; it was therefore determined to endeavour to ascertain what that quantity might be.

Experiment.—Twenty grains, part of the same residue, were exposed in a platina crucible to 350° F. (taken by a thermometer kept immersed in it) for about a quarter of an hour. It was found that by this process 3.10 grains were lost. The heat was now increased to redness, which was continued until the residue had become quite white. During the process much charcoal was formed, which was subsequently burnt off. By this process a further diminution of weight took place to the amount of 1.4 grains.

Recapitulation and conclusion.

One hundred parts of the solid residue, obtained by evaporating the saline water, and desiccating at 160° F. are composed of

Muriate of soda	83.0
Sulphate of magnesia	3.5
Carbonate of lime	4.5
Oxide of iron	1.5
Silex	0.5
Extractive matter, destructible at red heat	7.0
	100.0

Or, one imperial pint of the water contains

Muriate of soda	90.47	dried at 160° F.
Sulphate of magnesia	3.815	
Carbonate of lime	4.905	
Oxide of iron	1.635	
Silex	.545	
Extractive matter, destructible at red heat	7.63	

ANALYSIS OF THE SULPHUREOUS WATER.

This water was transparent and colourless, and, when poured from one vessel to another, exhibited no extraordinary disengagement of air-bubbles. On shaking the bottle the water became slightly turbid, shewing that there had been a deposition from it of solid matter. When tasted it felt soft in the mouth, and seemed to possess rather a putrid flavour. The smell was very offensive, resembling that of a cess-pool, mixed with an odour not unlike bad horseradish. Upon exposure to the air for twelve hours, this went off, and the surface exhibited a slight pellicle. The specific gravity of this water was 1.009. 72° F.

We shall now consider the properties of this water, as evinced by the action of certain chemical re-agents on it.

Action of Tests.

1. Soap in alcohol caused a curdy precipitate before and after the water had been boiled.

2. Litmus. No change of colour was produced on this test.

3. Nitrate of silver. A curdy cream coloured precipitate, entirely soluble in ammonia.

4. Prussiate of potash produced no effect,

5. Sulphuric acid caused an evolution of minute air-bubbles, with no sensible increase of odour in precipitation.

6. When boiled for a few minutes, its transparency was impaired; and, on cooling, a small precipitate was observed.

7. Oxalate of ammonia. An instantaneous white precipitate was thrown down, both before and after the water had been boiled.

8. Ammonia. A light whitish precipitate, insoluble in pure potash by boiling.

9. Muriate of barytes; this caused a white precipitate, insoluble in muriatic acid.

10. In order to discover if any nitrous compound was present in the water, a portion of it was evaporated to dryness: to a part of the residue were added a drop or two of muriatic and of sulphuric acids, and a little fragment of gold leaf. The whole was then boiled briskly, but no solution of the gold took place. To the other part was added sulphuric acid; a white acid fume was evolved, without any tinge of red, nor was any chlorine perceptible, although the water contained common salt.

11. Muriatic acid produced a partial disengagement of air-bubbles, but not the least hepatic smell, or precipitation. On the contrary, if added to water, rendered turbid by exposure, it made it transparent.

12. Oxalic acid. No instantaneous precipitate ensued, but, in a few seconds, a slight cloudiness was obtained, which was increased by standing.

13. Barytes produced a cloud, insoluble by muriatic acid.

14. Turmeric paper, dipped in it, underwent no change.

15. A piece of caustic potash was added to the water, and boiled in it: no ammoniacal odour was perceived, nor any vapour when a stopper, moistened with muriatic acid, was held over it.

Inferences from the preceding experiments.

That we might expect to find muriate, sulphate, or carbonate of lime and magnesia in combination, but no hepatic compound, no ammoniacal salt, no nitric salt, no free acid, nor acidulous salt. These facts, together with several other indications, derived from a comparison of the experiments one with another, tended to throw considerable light on the operation of the analysis which were to succeed them.

Sulphate of lime.

Ten grains of residue were submitted to the action of about a hundred grains of alcohol s. g. 812, and agitated now and then for half an hour. It was then filtered, and the solution was of a pale straw colour. This was evaporated to dryness, at 160° F. and weighed 67 grains. This was proved to be muriate of magnesia, coloured by a little extractive matter. The portion insoluble in alcohol was boiled with five ounces of water for a quarter of an hour; it was then filtered and evaporated to about an ounce, and alcohol was added to precipitate the sulphate of lime. This, when dried as usual, weighed 2.73 grains. In order to corroborate this experiment, another was made by dissolving the soluble matters left after the action of the alcohol, by a saturated solution of sulphate of lime, and then extracting this by boiling in water: the loss would give the weight of the earthy salt, which was found to agree exactly with the preceding statement, namely, 2.73 grains for every ten grains of the residue.

Muriate of magnesia.

Ten grains of residue were dissolved in very dilute nitric acid and filtered. The solution was accurately saturated by ammonia, and the lime precipitated by oxalate of ammonia. Bicarbonate of ammonia and phosphate of soda were added, and the triple subsalt when dried was weighed, and by calculation gave 0.675° of muriate of magnesia, dried at 160° F.

This agrees with the alcohol experiment before mentioned.

Muriate of soda.

Ten grains of residue, dissolved in distilled water and filtered, gave a precipitate with nitrate of silver, which, when dried at 160° F., weighed five grains. This corresponded to 2.1 of muriate of soda, but part of the muriatic acid belonged to the muriate of magnesia, for which I allow 0.53, which, deducted from 2.1, gives 1.57 grains in ten of residue for muriate of soda.

Silex, and vegetable extracts.

Ten grains of the saline residue, dried at 160°, were exposed for about a quarter of an hour in a platina crucible to 300° F. until no further diminution of weight was effected by that temperature. It was found to have lost 1.1 grain, which was water. A red heat was then applied, for about the same length of time; it was soon observed that the residue grew black, gave out the odour of decomposing vegetable matter, and, last of all, became much lighter coloured than before the experiment. It was now weighed, and was found to have lost eight grains by the heat which had been applied. A little pure muriatic acid was then poured into the crucible, and boiled nearly to dryness; it was then transferred to a vessel containing much water and boiled; what remained undissolved was nearly white, and, when dried at 160°, weighed 4.10 grains. This was silex.

Evaporation of the water.

Four pints of the water were evaporated over a slow fire very carefully, in a Wedgewood basin marked B. The residue was dried at 160° F. and weighed 524 grains. It was of a drab colour. Exposed to the air for some time, it gained 44 grains. Thus leading to the idea, that muriate of magnesia, or of lime was present. The following substances were proved to be present in the water, and the proportions were determined as afterwards to be shewn, namely, silex, vegetable extract, muriate of soda, oxide of iron, carbonate of lime, sulphate of lime, sulphate of soda, and muriate of magnesia.

Oxide of iron.

Ten grains of the residue were boiled in water, and the insoluble portion properly dried weighed three grains, which were dissolved in diluted muriatic acid. This was accurately saturated with ammonia, and precipitated by hydro sulphuret of ammonia. The sulphuret of iron formed was converted into a peroxide, and weighed .006 of a grain.

Carbonate of lime.

To the solution filtered from the iron was added oxalate of ammonia; a white precipitate fell instantly, which was oxalate of lime. The magnesia could not be thrown down by the oxalate, much muriate of ammonia being contained in the solution. The oxalate of lime was equivalent to 2.5 grains of carbonate of lime. A slight trace of magnesia was detected in the liquor after the separation of the lime, but so small as not to be appreciated.

Sulphate of soda.

On precipitating the sulphuric acid by barytes from ten grains of residue, the sulphate formed weighed 7.3 grains, which would be equivalent to 4.1 of sulphate of lime. But we have seen that only 2.73 grains are contained in ten grains of residue. I thought that sulphate of magnesia might possibly be present, but could not detect it. I likewise failed to detect potash by means of platina. A small quantity of the soluble portion of residue was crystallized.

Muriate of soda.

This could be distinctly perceived in cubes; and a number of indistinct forms like sulphate of soda, of which a few crystals were dissolved, and gave a white precipitate with barytes. It was thus concluded that the excess of sulphuric acid was combined with soda. To obtain the proportion, I deducted 2.73 from 4.1 = 1.37 = 1.45 sulphate of soda by calculation.

Summary of analysis.

One hundred parts of residue consist of

Sulphate of soda	14.5
Carbonate of lime	25.0
Oxide of iron.................	0.6
Muriate of soda...............	15.7
———— magnesia	6.75
Sulphate of lime	27.3
Silex	4.0
Vegetable extract and water not separable at 300°	8.0
	101.85

Or one imperial gallon contains

Sulphate of soda	18.965
Carbonate of lime	32.75
Oxide of iron	0.786
Muriate of soda	20.567
———— magnesia	6.75
Sulphate of lime	35.763
Silex	5.24
Vegetable extract & water not separable at 300°..	10.48
	133.393 nearly.

CHAPTER IV.

Remarks on the constituent parts of the Tonic Aperient Spa, as demonstrated in the preceding Analysis.

From the chemical analysis of the first of the Daviesville Spas, which, from the surest of guides, its effects on the human body, has been denominated the "Tonic Aperient," it is shewn that in each imperial pint, weighing 7290.7 grains, are contained 90.47 grains of muriate of soda, 3.815 grains of sulphate of magnesia, 4.905 grains of carbonate of lime, and 1.635 grains of oxide of iron; from which combination it is evident, that when drank in proper quantities, and at due intervals, its action on the intestinal canal may be confidently expected, and will not often fail. While the aperient properties of the spa are thus cleansing the chylopœtic viscera, freeing it from past accumulations, and guarding it from new ones, the chalybeate impregnation will protect the patient from any decay of strength, or loss of flesh. This effect it produces partly by its peculiar properties of invigorating the whole animal fabric, and partly by its salutary action on the stomach in particular; giving tone to that most important viscus, promoting the secretion of the gastric juice in it, and rousing the impaired appetite for food, while it enables that food to be comminuted and digested, and fitted for being mixed with the blood.

It is, therefore, not to be regarded with surprise, that patients in general, while subjected to the purgative influence of the tonic aperient spa, which would naturally lead them to anticipate enfeebling effects, really gain flesh and vigour. These pleasing consequences, however, are not uniformly of occurrence even in the same, nor, of course, universally so in all descriptions of persons. Much must depend on the habits of life, as well as on the constitutions of patients. Plethoric individuals will, to their great advantage, be reduced, either in the quantity of their circulating fluids when redundant, or in their corpulency when exuberant. In some instances lean and sallow patients have, by the prudent use of the water, acquired the hue of health, with elasticity of fibre, and a buoyancy of spirits hardly to be controlled and moderated.

But these delightful results are not to be attributed to the chalybeate impregnation solely, nor solely to the laxative ingredients, but to the happy union, and conjoint action of the whole, enlivened and acuated by the carbonic acid. With this the water is amply enriched, yet it exists in so loose and volatile a state, that even when the spa is in the act of being drawn from the cistern, it must be most expeditiously drunk to prevent the gas from being lost. It is not, however, so much on account of its own remedial properties that its loss would deserve to be regretted, as because it possibly may be, and very probably is the solvent of the iron, which I contemplate as an highly important ingredient in the combination. Of this supposition, the following circumstance seems strongly corroborative.

A portion of the spa, now under consideration, was taken, in a well corked bottle, from the cistern in the pump-room, into which it had been recently pumped, to a house in the immediate vicinity, for the purpose of being submitted to certain tests, with the view of verifying the actual existence of iron in it, and of ascertaining its probable proportion. Several tests were ineffectually tried, and trials on a second supply were also made in vain; but on repairing to the pump-room, and obtaining a supply immediately from its source, each test that had failed before at once succeeded, and made the presence of iron, combined with carbonic acid, perfectly evident.

From this interesting discovery, the following important practical inferences may be made:

1.—That unless the water be drunk fresh from the spring, its chalybeate or invigorating principle is lost.

2.—That the carbonic acid, which consists of seventy-two parts of oxygen, and twenty-eight of carbon, and imparts such piquancy to the water, as to disguise whatever medicinal taste may reside in it, is also lost unless the water be drunk as soon as drawn. But, in addition to the pleasing appearance which it imparts to the spa, distinguishing it from common water, and begetting the confidence of the visitors, this article possesses medical virtues of no inconsiderable value; for, in common with other acids, it is both diuretic and antiseptic, and, when it agrees, it cheers and enlivens the spirits in a peculiar manner. When such are its effects, the benefit of them should be secured to the patient, as they will greatly conduce to his recovery. In some instances, however, this gas is productive of drowsiness and headach; and in others, especially when the waters do not pass freely, of uneasiness and distention of the bowels.

3.—That if the circumstances of any disease, or of the constitution of the patient, prohibit the use of the chalybeate impregnation, while they demand the exhibition of the laxative ingredients, the water, by being exposed in an open tumbler to the atmosphere for a short space of time, will part with the chalybeate, by its evaporation with the carbonic acid, or by its precipitation from it.

4.—That if any of the disagreeable effects of the carbonic acid occur in any individual drinking the water, those effects may be obviated on every subsequent occasion, by resorting to the means just mentioned, of detaching the acid from the water, by exposing the water for a short time in an open vessel.

5.—By this management it is obvious that, out of the self-same spring, two waters may be formed of perfectly distinct medical properties: one a pure saline, with, or without, the carbonic acid; the other the same saline, with, or without, the chalybeate principle. Of this disunion of its most efficient ingredients the great advantage is, that the water may be adapted to the varying forms, as well as the various stages, of disease.

To make this position more clear, I will suppose a patient to arrive at Daviesville in a state of plethora, the effect of too free, too full, a mode of living. Under such circumstances what prudent physician would think of advising a chalybeate, that is, a stimulating spa? But when the pure saline, disengaged from its chalybeate ingredient, shall have been taken a requisite time, to cool, cleanse, reduce, and so to prepare the system of the patient, he may then with very great propriety enter on the use of the spa with all its impregnations.

This illustration relates only to the same affection in its different stages, or degrees. But I will further suppose that a patient arrives with chronic inflammation of some part of his frame, within or without. In such a case, the preparations of iron are wholly inadmissible first and last, being quite irrelevant to the nature of the malady. Still, however, the pure saline will be productive of very beneficial effects, and therefore deserves to be considered as a very suitable and appropriate remedy, either singly, or in conjunction with such other means as the peculiar nature of the affected part may require. I will only add that the spa, now under consideration, possesses a very strong affinity with that mineral water at Cheltenham, which is called the "*Montpelier well*," as the following summary of its analysis by Messrs. Brande and Parke, the very eminent chemists, demonstrates.

It is termed No. 1. The strong chalybeate saline water, the specific gravity of which is = 1.0092. One wine pint, after being kept six hours at a temperature of 212°, yields 74 grains of dry salts, consisting of

	GRAINS.
Muriate of soda	41.3
Sulphate of soda	22.7
Sulphate of magnesia	6.0
Sulphate of lime	2.5
Carbonate of soda and iron	1.5
	74.0

The pint yields about 2.5 cubic inches of carbonic acid gas.

CHAPTER V.

Of the various forms of Disease to which the Tonic Aperient Spa is more particularly adapted.

It is sufficiently obvious, that in almost every deviation from the enjoyment of good health, the use of mild purgatives conduces to the removal of the cause of the indisposition, and consequently to the re-establishment of the healthy state. This fact is now so familiarly known to all classes of the community, as to require neither proof nor illustration. Nor is it less known, that, in the more ordinary ailments, the simplest forms of medicine are equally efficient with the more complicated; at the same time that they are less unpalatable to the patient, and perhaps more congenial to his constitution. I do not, therefore, hold it to be necessary to employ arguments or persuasions, with the view of inducing the public to have recourse to the Daviesville waters, for the removal of those lesser affections to which we are all so prone.

But I propose to shew, that in those disorders of the human body which are of some continuance, and, therefore, more or less fixed, and are dependant on the obstruction of some important organ, impeding its functions, or injuring its structure, tending thereby to ruin the health, and even to destroy existence, the timely and judicious use of the mineral waters is at once the safest, and most promising mode of procuring relief.

Even by way of prevention these waters may be very advantageously employed; and it would be fortunate indeed for the human race, if they would but see in the indulgence of their mistaken and imprudent habits of life, the sure visitation of impending disease, and subdue it in its infancy, instead of having to encounter it in its vigour. This is that "*timely care*" to which the didactic poet alludes, and for want of which he says

> "Millions have died of medicable wounds."

The illustrious Bacon, whom the literati of all Europe acknowledged to be the founder of the only valuable philosophy, that of Fact and Observation; who opened the avenues of all science, had the most comprehensive way of thinking on every subject, and who will never be regarded but as one of those superior beings whom nature is very sparing in the production of, had the sagacity to see how the health of the body was improved, and the duration of existence prolonged, by the frequent use of purgatives, the operation of which he conceived to be a mode of carrying off the old juices, and supplying new ones ; or, to use his own expression, of "renovation by turns."

"We do confidently affirm," he says, "neither let any man reckon us among those heretics which were called Cathari, that often purges, and made even familiar to the body, are more available to long life than exercises and sweats. For it is most certain, that by sweats and outward perspirations, not only the humors and excrementitious vapours are exhaled and consumed, but together with them the juices also and good spirits, which are not so easily repaired : but in purges, unless they be very immoderate, it is not so, since they work principally on the humors. But the best purges for this intention are those which are taken immediately before meat, because they dry the body less, and therefore they must be of those purgers which do least trouble the belly."—*History, natural and experimental, of Life and Death, or of the Prolongation of Life.* 1664.

The parts of our frames most liable to become the seats of morbid actions, and most susceptible of the beneficial operation of the Tonic Aperient Spa, are the contents of the abdominal cavity in general, but in particular the stomach, the liver, and its appendage the gall-bladder, the pancreas, the spleen, and the mesenteric glands. It is of certain diseased actions of these parts, therefore, that I design to treat, and first of those of the stomach.

CHAPTER VI.

Of such morbid affections of the stomach as are likely to be relieved by the use of the Tonic Aperient Spa.

THE stomach, being the organ which performs the most important offices in the human body, is thereby exposed to many disorders peculiar to itself, such as indigestion, acidity, heartburn, and pain, which are here selected because they are adapted to the beneficial operation of the Tonic Aperient Spa.

In addition to these morbid actions, it is the prey to many others, in consequence of its sympathy or consent with almost every other part of the frame when affected with disease. In consequence of its liability to assume the sensations and symptoms of disease when no distinct disorder exists in it, much difficulty is often experienced in determining whether the affection be secondary or original; and it accordingly demands the exercise of no ordinary discernment and sagacity in the physician to decide the question.

The circumstances, however, which require the aid of the Tonic Aperient Spa, are in general of a more simple nature, and admit of a prompt decision.

One of the commonest causes of complaint resident in the stomach, is overfull feeding with various kinds of rich food, accompanied with a neglected state of the bowels; in consequence of which the patient incurs the loss of his appetite for food, becomes bloated, flatulent, half sick, and incapable of digesting what he eats. His nights are restless, his sleep unrefreshing, his spirits depressed, his countenance sickly. When, in addition to the symptoms thus enumerated, the tongue is thickly coated with yellowish mucus, the breath is fetid, the patient is thirsty, has a bitter taste in his mouth, with a sensation of heat in the region of the stomach, and pain and heaviness of the head, we may be assured that the stomach is seriously oppressed.

Cases of this description, however varying in degree, are of very frequent occurrence, and are particularly suited to the action of the Tonic Aperient Spa. But it is to be carefully noted that when a patient thus circumstanced arrives, he must on no account enter at once on the use of the spa. Time must be taken to allow the excitement caused by his journey to subside. His bowels, even though a spontaneous diarrhœa be present, should be cleansed by a suitable cathartic. His diet must be lowered: and after the expiration of two clear days he may commence a course of the water, which, for the two first days of its use, should be divested of its chalybeate impregnation.

The time of the day when the water is found to exercise its action most favourably is the morning, when the stomach, being empty, is in the properest state to receive it; and the quantity generally found sufficient is half a pint at each draught, the whole number of draughts being three. The first draught should be taken at ten minutes before seven, the second at ten minutes after, and the third at half-after that hour; thus allowing an interval of twenty minutes between the first and second draught, and of half an hour between the third draught and breakfast-time, which I am supposing to be eight o'clock. After taking the first and second draught, the patient should sit for five minutes, and then ride or walk for a quarter of an hour, so as to fill up the interval. After taking the last draught, the whole interval should be employed in riding or walking.

It is not desirable that the operation of the water should be more than moderate. Three discharges from the bowels are abundant for every salutary purpose, more than which for any continuance would probably enfeeble the patient. Should that number fail to be procured by the quantity specified, it would be more eligible for the patient to take a pill over night in aid of the water, than to increase the number of draughts, or the quantity directed for each. On the third morning after the commencement of the course, the patient may take the spa with the chalybeate impregnation, in which he may safely persevere for any length of time.

Another unhealthy state of the stomach to which the Tonic Aperient Spa is well adapted is a sensation of acidity, accompanied with pain, and a kind of anxiety more distressing than pain itself; with which are united sickness, flatulence, distension, and depression of mind, As a confined state of the bowels aggravates all those symptoms, and is usually associated with them, a course of the Tonic Aperient Spa, taken in the manner before mentioned, will not fail to be an excellent auxiliary to such other treatment as the peculiar circumstances of the case may require.

Heartburn, another deviation in the stomach from its healthy state, differs not essentially, either in its cause, or the treatment required, from the complaint just spoken of, and the patient may advantageously drink the tonic aperient spring in the manner before mentioned.

Another disease of the stomach is pain, which if it occur after meals, and particularly if it be attended with constipation of the bowels, will rarely fail to be alleviated by a course of the Tonic Aperient Spa. But its radical treatment must be directed to its precise cause and nature, when they can be ascertained. If such pain occur at intervals, especially long ones, the health being otherwise good, the existence of gall-stones may, with great probability, be suspected, as the entrance of a gall-stone into the *ductus communis* has not unfrequently been mistaken for pain of the stomach itself, neither of these affections being accompanied by fever. One important mark of distinction is, that in the passage of a gall-stone the pain is confined to a less space, which is exactly where the duct enters the duodenum. Whereas in the gastrodynia, the pain is diffused over the whole stomach, and, like other diseases from torpor, the pulse is weaker, the extremities are colder, and the general debility is greater than in the passage of a gall-stone; for in the former the debility is the consequence of the pain, in the latter it is the cause of it. After due diligence has been used to discover the precise character of the pain, if it be judged to originate in the stomach itself, and is quite unconnected with any inflammatory or serious affection, the employment of a morning course of the Tonic Aperient Spa, with the chalybeate impregnation, will be proper, but rather as a laxative, than a purgative. At first it should be taken on alternate days, and in all cases of this kind should be preceded by an emetic. A very useful adjunct to this practice will be the daily use of the vegetable bitters with aromatics, which are of great importance in the practice of physic, on account of their property of improving the general health.

CHAPTER VII.

Of such morbid states of the liver as are likely to be relieved by the Tonic Aperient Spa, and first of acute inflammation.

The term Bilious Diseases, though, accurately speaking, it should be restricted to the diminished or increased secretion of the bile, its deviation in colour and consistency from a healthy condition, and the hindrance to its free flow, when secreted, from its receptacle the gall-bladder to the duodenum, has of late years passed current for the various affections of the digestive organs in general, and has occasioned some perplexity to the medical practitioner, and frequent disappointment to the patient.

It is my purpose to speak of each of these states with precision; and I hope to convince the reader, that the Tonic Aperient Spa, judiciously used, and occasionally assisted by other means, is a most appropriate remedy for each of them, how distinct soever they may be, and really are from each other.

But, in addition to this derangement of the functions of these viscera, I design also briefly to treat of such morbid states of the organs themselves, as are susceptible of the beneficial action of the spa; and as the functional affections are generally consequent to some altered state of the parts which govern them, I shall give precedence to the consideration of the parts when deviating from a natural state, and of the symptoms, or signs, by which they may be known and distinguished.

And first of acute inflammation. In warm countries inflammation, originating in the substance of the liver, and running into suppuration, is by no means an unfrequent disease; but, in the more temperate climates, the inflammation commences in the membrane which invests the liver, and, if neglected, extends to the part lying immediately below it, but without affecting the whole volume of the organ. This is usually the case, and constitutes the acute form of the disease.

But, whether the inflammation first engaged the coats of the liver, or its substance, it will, unless skilfully and successfully resisted, cause a great increase in the size of the organ, and abscesses will form in it; after which the symptoms denoting active inflammation will very much subside, and the chronic form of the disease is to be considered as having succeeded to the acute.

The symptoms which denote inflammation of the investing membrane of the liver, constituting the acute form of the disease, are symptomatic fever, with a sharp pain of the right side, cough, and difficulty of breathing. But as the resemblance between this affection and inflammation of the pleura on the right side is striking, the following circumstances may properly be mentioned as serving to discriminate them. A deep inspiration will be productive of much less pain in inflamed liver than in pleurisy; and pressure below the margin of the ribs on the right side, which would cause no pain in pleurisy, will greatly aggravate the pain when the coats of the liver are inflamed.

The treatment of this formidable disease should be commenced without the least delay. It should consist of a regimen in every respect rigidly abstemious. A full bleeding should be made from the arm, and repeated at the expiration of a few hours, unless the symptoms be most unequivocally relieved. Immediately after the first venesection a saline purgative should be administered, and repeated at short intervals, till the bowels are freed from all accumulations, and thoroughly cleansed. Then refrigerants should be prescribed in union with antimonials. These measures having been carried into full effect, leeches should be placed along the margin of the lowest rib, or cupping glasses with deep scarifications, and this process may be repeated on alternate days twice or thrice.

Under favourable circumstances, the result of this treatment will hardly fail to be so far satisfactory, that the symptoms of the constitutional affection will have subsided, the respiration will be easy, and without pain, and but little tenderness will be caused by making pressure on the affected part.

Now, and not until now, when the inflammation, which had beset the investing membrane of the liver, is considered to have so far subsided, that pain in only a slight degree remains, it will be proper as a measure of precaution against future obstruction, or abscess in the substance of the liver, and more particularly if jaundice has accompanied the symptoms already detailed, or is now present, to direct a mercurial friction on the region of the liver every night for a week or ten days. The patient must, however, be watched with very great attention, and it must carefully be observed whether the relics of the former pain be augmented, or the pulse be accelerated by it. If no such effects be produced, then the frictions may be continued till some affection of the mouth, demonstrating the action of the mercury on the constitution, be excited.

In conjunction with these means, the regimen must be more liberal, and the vegetable bitters in light infusion may be administered twice daily. Now this after treatment can no where be more advantageously employed than at Daviesville, where the morning course of the Tonic Aperient Spa, without the chalybeate impregnation, till circumstances occur to demand it, will greatly aid in expediting the convalescence of the patient, and in confirming his recovery.

CHAPTER VIII.

Of chronic inflammation of the liver, and the great advantages likely to accrue from a judicious use of the Tonic Aperient Spa, in conjunction with appropriate medical treatment.

In the preceding chapter I have treated of that form of diseased liver, which, from the suddenness of its attack, the rapidity of its career, and the urgency of the symptoms, is denominated acute hepatitis; of which affection the coat or membrane of the liver is generally the seat.

I am now to treat of a disorder of the same organ, less alarming at its onset because more moderate in the symptoms which accompany it, and particularly by the absence of pain; yet in reality more formidable, and more frequently fatal, because more apt to be neglected. I mean chronic hepatitis.

When this disease is a consequence of the acute form, which sometimes happens, the inflammation, which had affected the membranous covering of the liver, extends itself to the subjacent part, and thus generates one species of chronic hepatitis. In this case, the vigilant practitioner, who had been entrusted with the management of the previous disease, would regard the apparent convalescence of his patient as imperfect and delusive, and would persevere in the employment of suitable means to effect the resolution of the inflammation, so as to avert the formation of abscess.

More frequently, however, chronic hepatitis makes its approaches insidiously, and attacks the substance of the liver independently of its membranes, or the neighbouring parts. In this case, as the liver, from the exility of its nerves, is endued with but little sensibility, it is visited with no positive pain, and awakes no sympathetic actions, or such only as, from their slightness, fail to claim the attention of the mind.

Among the first sensations of the patient when the disease is beginning to develope itself, are a lassitude and heaviness of the right arm; some uneasiness in the right hypochondrium, and a peculiar sympathetic feeling, rather than pain, on the top of the right shoulder. The patient lies best on the right side, and is harrassed with a dry irritative cough; symptomatic fever arises, and occasionally the skin and eyes become tinged with yellow, forming a somewhat deeper hue than that which constitutes a sallow countenance. So obscure, however, on some occasions are the collective, as well as individual symptoms, that until suppuration has taken place, and an abscess has been formed, no knowledge is acquired of the real nature of the complaint under which the individual labours.

Under these last circumstances the condition of the patient, though most discouraging, is not altogether hopeless, as the abscess may have a direction outwards, and may point between the ribs on the right side, or below them; in which case a timely opening should be made, to hasten as well as to facilitate the escape of the matter, which if it should make its way in any other direction, such as the abdominal cavity in general, or that of the intestines in particular, or that of the lungs, will in most cases prove fatal, but more quickly in some of these issues, than in others. In some rare instances, where the abscess has broken into the common duct of the gall-bladder, the patient has escaped.

In this sad state of things, evacuations of all kinds are wholly out of the question; and the strength of the patient is to be upheld by the most free use of the cinchona, and a diet as nutritive as possible, but by no means stimulating.

But before matters have come to this pass, if there be even slender, not to say probable, grounds for conjecturing that the liver is engaged in the exhibition of the leading symptoms, a full course of the Tonic Aperient Spa, divested of the chalybeate impregnation, and taken in such quantities as shall make the bowels fully respond, will in all probability be of signal utility, in opening, by its penetrating influence, the obstructed liver, subduing the inflammatory action, and averting the terrible consequences already described.

It must, however, be clearly understood, that this event so desirable, demands that the waters be not solely relied on, but must be taken in conjunction with other remedial means, which must be directed by the medical gentleman who may have the management of the case.

CHAPTER IX.

Of a torpid state of the circulation in the liver, inducing permanent organic disease, and the utility of the Tonic Aperient Spa in averting it.

In addition to such lesions of the liver as are the result of those increased actions which are termed the acute and chronic inflammation of it, there are other evils of even greater magnitude, which beset and vitiate this most important organ, but particularly one, in which the action of the blood vessels is in an inverse ratio, and the circulation, instead of being increased and hurried, is retarded and languid.

This state is often, perhaps generally, attributable to the indiscreet use of ardent spirits, or other fermented liquors. These, as may readily be supposed, act in the first instance on the part with which they come in more immediate contact, that is the stomach, and produce inappetence, dyspepsy, and those numerous distressing sensations of which hard drinkers so deeply complain.

It is not, however, to be denied that other causes may, and occasionally do, operate in the production of hardened masses in the liver, such as those which generate them in other glandular parts, namely, an ill habit of body, and even external violence. But, I am persuaded, that by far the most frequent cause is the inordinate and unseasonable use of spirituous liquors, which injure the liver in a peculiar manner, and in a far greater degree than they do the stomach, of which last viscus the diseases are from its structure of a less fixed, and more remediable nature.

But the languor and lassitude which are associated with the stomach affection cannot but be partaken of by the heart; in consequence of which the circulation over the whole system becomes feeble and inert, but in a more especial degree in the nice and intricate structure of the liver, where congestion may with so much probability be expected to form, and thus to lay the foundation for tubercles in different parts of the organ, or for the induration of its whole substance.

When this morbid alteration has begun to establish itself, its existence may be conjectured from a dull but permanent uneasiness in that part of the right side which is termed the region of the liver, together with a sickly sallow hue of the countenance of the patient. But if, in addition to these symptoms, the margin of the liver can be felt, as in some thin patients it not unfrequently may, and imparts to the touch an impression of irregularity in its structure, or a want of the natural elasticity, the case may be considered as ascertained and put beyond doubt.

Nothing now remains but to place the patient under the most propitious circumstances for the palliation, or, if it be possible, the perfect cure of his complaint. In the first place, if the imprudent use of strong liquors, of whatever denomination, be even the suspected, not to say the ascertained cause of the disease, a prompt and entire discontinuance and renunciation of them must be undergone by the patient. This is the *sine quâ non* of the ulterior treatment, without which every effort will be nugatory, and every aid unavailing.

If the tuberculated or indurated state of the liver be not very extensive, there is a probability that by amending the general health, and keeping the circulation in subjection, the local affections may be prevented from inflaming, and thus they may for many years be restrained from spreading.

Now to accomplish this desirable object, a cooling and nutritious regimen of milk and farinaceous aliment, with a slender allowance of fresh animal food and barley water, rendered palatable by saccharine or acidulous additions, must steadily be persisted in for a due length of time.

As to the medical treatment, that will properly be left to the judgment of the attending physician, and must be varied according to existing circumstances. But it may be laid down as a general rule, that the patient may take about a pint, or a pint and a half of the Tonic Aperient Spa at Daviesville, every, or every other morning, according to its action on the bowels, and to its effects on the system at large.

As to the more inveterate forms of this affection of the liver, in which inflammation of the part and the consequent symptomatic fever cannot be prevented, and the strength fails, and emaciation rapidly goes on, it is obvious that they are unsuitable to the mineral waters, and therefore I shall wave the further consideration of them.

CHAPTER X.

Of bilious diseases, and the great utility of the Tonic Aperient Spa in the treatment of them.

Hitherto I have treated of those disordered states of the liver by which it is affected, in common with the other parts of the animal fabric, namely, the acute and chronic inflammation of its investing membrane, and of its substance; also of congestion of its vessels, and induration of portions, or the whole, of its structure; and I have endeavoured to show under what circumstances these separate affections admit of alleviation, or cure, by the cautious and judicious use of the mineral waters of Daviesville, and when those waters are wholly inadmissible.

One further, and not uncommon affection of this most important part of the abdominal vicera still remains to be adverted to, namely, a partial or entire stop to the secretion of the bile, or the hindrance to its passage into the gall-bladder, or from that cavity, when it has arrived there, to the intestines.

As the great function and use of the liver is to separate the bile from the blood, for various essential purposes in the body, it is to be regarded not as a gland of waste, but of supply; and it may very truly be said of it, that it cannot but go ill with the individual, in whom a just secretion of healthy bile is not regularly performed by the liver, and when secreted, is not as regularly conveyed in the first place to the gall-bladder, and subsequently from the gall-bladder to the corresponding intestine: there to unite with the aliment, and the secretions of those other organs, which contribute to perfect the great work of digestion, by which alone the body is to be at once nourished and sustained.

When, therefore, this indispensible fluid, the bile, is from any cause withheld from the course which it is destined to pursue, it is customary to term the affection *bilious*, whether the bile be defective, or in excess; whether it be detained in the blood, from the insufficiency of the liver to extract it, or confined in the gall-bladder by any mechanical, or other impediment to its exit; or, finally, whether it be impaired in its consistence, or vitiated in its quality. I shall, therefore, in conformity with long established custom, treat of these varied affections under this one comprehensive term, with the stipulation, however, that I shall limit the application of the term to those peculiar affections which owe their origin and continuance to some such irregularity in the biliary system as I have explained, and to that alone.

The defect of bile, arising from a total incapability of the liver to detach it from the blood, is an occurrence of such rarity, that until Europe was overrun with the Asiatic cholera, the possibility of it was hardly to be contemplated. That terrific disease, however, made it a matter of demonstration, that the liver, as a gland of secretion, became wholly inert and powerless; and that its functions were laid prostrate, until they were resuscitated, as it were, by the happy influence of medicine. In no other instance has the total retention of the bile been known to occur, but a modification of this unnatural state of the liver may be assumed to be present, when that receptacle of the bile, the gall-bladder, is so distended with the secreted fluid, that it can receive no more, being incapable of disgorging that which has already been poured into it, from an obstruction of the cystic, or the common duct. A modification, not wholly dissimilar to this, may originate in an obstruction of the hepatic duct, the uses of which are to convey to the intestine some portion of the hepatic bile, without the intervention of the gall-bladder, and perhaps to act vicariously with it.

When this total and entire stop to the secretion of bile occurs, as in the case of patients unhappily attacked by the Asiatic cholera, none but the most prompt and energetic measures will be of avail. With these are to be associated the most scientific and judicious treatment, in aid of the medical means. Every description of assistance is imperatively called for by the urgency of the symptoms, nor is any delay whatever to be admitted of.

Of this defect of the biliary secretion the reverse state is an excess of it, which in this country is of no unfrequent occurrence, and to which many individuals are more particularly prone in the autumnal months. This disease is generally very sudden in its attack, but is remarkable for the comparative mildness of its onset, and its subsequent severity. For the first six or eight hours the patient conceives himself to have a common diarrhœa, and being unable to account for it, he naturally thinks that being spontaneous, it must be salutary. A very distressing sickness, however, soon comes on, with vomiting large quantities of pure bile, accompanied with copious discharges of the same fluid from the intestinal canal, which suffers severe griping pains from the irritation of the bile. To these are added cramps in the muscles of the legs, which continually harrass the patient. Great debility ensues, the pulse of the patient becomes feeble and rapid, and he is involved in imminent danger.

Of this affection, therefore, the characteristic signs are the bilious vomitings and purgings, the pains of the intestines, the spasms of the lower extremities, and the great exhaustion of the strength; which last symptom, I conceive, is best accounted for, by referring it to the vast and immoderate secretion of bile; though some writers on this subject have attributed it merely to the action of this fluid on the stomach and intestines. Undoubtedly it is an essential point in the treatment of this affection, abundantly to dilute the contents of the first passages with animal and farinaceous broths, which possess the additional advantage of sustaining the strength of the patient, while they, by their lubricity, sheath, and protect the villous surfaces of the stomach and intestines, from the intense acrimony of the bile.

The pinching pains of the bowels, as well as the cramps of the inferior limbs, will be much alleviated by the often repeated use of the warm bath at ninety-eight degrees of heat. To this is to be added opium in a solid form, as being less likely to be rejected, but the substantive point is to prevent the bile from lingering in the bowels, by administering saline purgatives in small, but often repeated doses. For this purpose, if the patient be resident in the vicinity of the spa, he may take six ounces of the Tonic Aperient, without the chalybeate impregnation, every four hours, as long as any unmixed bile continues to be discharged, or while the symptoms, denoting its presence in the alimentary canals, remain. And when these shall have subsided, a morning course of the same spa, with its chalybeate impregnation, will hasten the convalescence of the patient, and remarkably conduce to guard him against a relapse. This course he might continue daily for about ten days, and for about a fortnight longer on alternate days only, when the course may be considered as complete.

The next branch of this subject is when the bile having been duly secreted in the liver, and deposited in the gall-bladder, is prevented from passing out of that viscus by one or more gall-stones, or biliary calculi, a case of no unfrequent occurrence.

In these circumstances, pain ensues in such a degree, as to demand the utmost exertion of the fortitude of the patient. That pain is uniformly seated in the direction of the gall-ducts, and its precise situation varies, as the cause of it advances towards their termination in the intestine, suddenly ceasing as soon as it has entered it.

In the intermediate time the secretory action of the liver is suspended, and the bile, which should be detached from the blood, is retained within it, making itself conspicuous by the well-known symptoms of the yellow stain in the white coats of the eyes, the urinary secretion, and the whole surface of the body, and by the colourless state of the alvine discharges.

This collection of symptoms constitutes one, and that the least hazardous of the forms of that disease, which is familiarly called the yellow jaundice. From this account it appears, that with the production of this species of bilious disease, the liver is probably quite unconnected, unless, which I have been led to conjecture in some instances, gall-stones may owe their origin to some morbid quality, or consistence in the bile when secreted, and prior to its entry into the gall-bladder. The general opinion, however, is, that the mechanical obstruction consists in an inspissation, or coagulation of the bile during its residence in the gall-bladder. Under either of these circumstances, the concretion, when examined after its exit from the bowels, should impart a bitterness to the taste, that being the great characteristic of the bile, of which it would seem impracticable to deprive it. Biliary calculi are, however, variously composed, some being quite destitute of every degree of bitterness, from which fact it may with probability be inferred, that bile is not an indispensible ingredient in their formation. But of what materials soever they may be found, when chemically examined, to consist, there is sufficient reason to believe that all descriptions of them admit of perfect solution in the *acidum nitrosum* of the Edinburgh Pharmacopœia, and in that alone, a fact of no small importance in a practical point of view.

While the gall-stone is being propelled toward the duodenum by the efforts of nature, which consist in dilating the passage before, and contracting it behind the stone, nothing, in ordinary cases, is requisite to be done, but to lessen the sensibility of the patient by stupefactive medicines, so to assuage the anguish which he has to endure. But as soon as the calculus has escaped into the intestine, it is an essential part of practice to put the bowels into full activity; not only for the purpose of carrying off the bile which has been withheld in the gall-bladder, but to emulge the liver itself, and call forth a full discharge of the bile which has stagnated there, and also to cleanse and purify the blood from the same fluid which has regurgitated into it.

For this purpose the preparations of mercury are of absolute necessity, and their efficacy will be much increased by the co-operation of saline purgatives. After medicines of this description have effected these objects, a course of the Tonic Aperient Spa, with its chalybeate impregnation, will be of infinite use in establishing the convalescence of the patient, and confirming his restoration to health. It will do even more than this; it will dilute and medicate the bile throughout the whole biliary system, and thus contribute to prevent the formation of future calculi, and to promote, and facilitate the discharge of such as may still be present.

Before I conclude my observations on the subject of bilious disorders, I must advert to one other species of jaundice, which fortunately is of less frequent occurrence than that of which I have treated, for it can hardly be said to be under the beneficial influence of medicine, however skilfully administered.

The disease to which I refer is vulgarly called the black jaundice; but as the stain is a mixture of green and yellow, the former predominating, it would be more accurate to call the affection the green jaundice.

Persons who have attained, or exceeded middle age, and especially those who have been addicted to the intemperate use of strong liquors, are most frequently the subjects of this complaint. The liver itself is the seat of it, being distempered throughout its whole substance; yet it suffers scarcely any pain except when pressure is made on it, when some tenderness is complained of. The fœces and urine are variable, being sometimes defective, and at others abundant in bile, but generally they are pale. The pulse undergoes no alteration from a healthy standard.

The progress of this disease towards its usual fatal termination is slow, seldom occupying a shorter period than a year or two, and sometimes the patient lingers a still longer time.

The preparations of mercury are always entitled to a trial in this affection, and sometimes inspire the patient with a confidence of his amendment; but they should be used with much circumspection. A safer method is to maintain an increased action of the bowels, by the daily use of any of the neutral salts. One of still greater promise is a full course of the Tonic Aperient Spa, divested of its chalybeate impregnation, and associated with a strict regimen, horse exercise, and such other aids as the deobstruent class of medicines affords.

CHAPTER XI.

Of some affections of the pancreas, the spleen, and the kidneys, and the aid afforded in the treatment of them by the Tonic Aperient Spa.

In treating of the diseases of the abdominal viscera which are susceptible of benefit from the use of the waters of Daviesville, I have thought it necessary to include certain morbid affections of those parts which are mentioned in the title of the present chapter; because, from their relative situation to the other more important viscera of this cavity, the sensations peculiar to each, are so apt to be confounded with the rest, as to make discrimination always difficult, and sometimes impracticable; a natural effect of which is, that we may be led to the employment of remedies not apposite to the part actually affected.

In the investigation of the affections which are usually termed dyspeptic and bilious, with reference to the stomach and the liver, we too readily consign all the symptoms of which our patients complain, to one or the other of these parts, but in an especial manner to the former; not always keeping in our minds, that the stomach often exhibits symptoms of being itself unhealthy, when, in reality, it is only sympathising with the morbid condition of other parts, especially such as are in its more immediate vicinity. And with regard to the liver, it may safely be affirmed, that there is no part of our structure, respecting the state of which greater mistakes are continually made.

Another fertile source of confusion, is the very imperfect, if not inaccurate, description which patients give of their sensations; and still another that they are never unprepared to pronounce the nature, and to fix the very name of their disease.

Even we ourselves often err in too hastily forming opinions as to diseases, before we have sufficiently investigated them, in consequence of which questions are inaccurately put, the result of which is, that we mislead the patient to give an erroneous description, and are ourselves misled by it.

These remarks naturally arise from the consideration of the diseases to which the pancreas and spleen are subject, and the acknowledged difficulty of discriminating them by any peculiar symptom from those of the more important parts which inclose them.

That the pancreas is liable to be attacked, in common with the rest of the body, by inflammation, and its natural consequences, abscess and ulceration, is quite evident; but that in comparison with other parts it is less often so engaged, is equally evident from the infrequency of its being found, in the schools of anatomy, with signs of any previous disease. Still, it is to be presumed, that a temporary morbid action takes place not unfrequently in this gland, with an interruption to the performance of its functions, on which account it is desirable that we should rightly know by what peculiar symptoms it may be detected.

Now if inflammation be present, which is the only acute disorder to which it seems to be liable, in addition to the constitutional symptoms mark-ing that state, a deeply seated pain in the region of, and, as it were, behind the stomach, is complained of. This pain is augmented by pressure with the hand, and by a recumbent posture of the body, especially if the patient be supine. On the other hand a kneeling, or sitting posture, with the trunk thrown forward on a cushion, or table, alleviates the pain, and affords temporary ease.

Should this inflammation not take a favourable turn, but terminate in the formation of an abscess, a slow consuming illness will be the consequence until the rupture of the abscess takes place, and an inaccessible and incurable ulcer afterwards, ending in the death of the patient.

Nausea when the stomach is empty, and sickness and vomiting when it has received food, with extreme emaciation, are the symptoms which occur with the greatest uniformity. As the disease advances, pain will be almost constantly present, depriving the patient of the consolation of sleep. The debility from the want of rest, and from the rejection and indigestion of the food, fast increases, a colliquative diarrhœa ensues, and the kidneys, ceasing to perform their functions, dropsy supervenes, and death closes the scene.

I have been the more particular in detailing these sad consequences, because I am persuaded that the morbid affections of this part are apt to be overlooked entirely, or confounded with others, and even thought to be of very rare occurrence. It may be so, but, when it does occur, the safety of the patient most absolutely depends on the practitioner having a right knowledge of it at the onset, and on his successfully combating it during the inflammatory, which is the only curable stage.

Another morbid state of the pancreas, which probably is dependent on ts glandular structure, is scirrhus, or induration of part, or even the whole of its substance, with a tendency to a greater or less enlargement of its size. This is a slow process, and is for some time after its commencement attended with so little inconvenience, as scarcely to suggest itself to the patient. As long as the part has undergone no considerable enlargement, the patient complains less of pain than uneasiness, and this more particularly when the stomach is full. But when in addition to the indurated state of this organ, it becomes much increased in bulk, a very distressing pain afflicts the patient, and the indigestion and rejection of the food which ensue lead to such a degree of emaciation that it can be distinctly felt, and its outline traced by the finger.

In circumstances such as these, little good can be rendered by any kind of treatment. But if the mischief can happily be ascertained at its commencement, or soon after, a diet of milk and vegetables, with an occasional allowance of fish, horse exercise, and a total abstinence from all fermented liquors, will place the patient under the most favourable circumstances to stay the further progress of the disease, which, the self-restoring powers of the constitution, thus befriended, may ultimately subdue. To these efforts may be added the employment of medicines of that class which is called deobstruents, and a circumspect and prudent course of the Tonic Aperient Spa at Daviesville, which may greatly assist in resolving the obstruction of the glandulous structure, and rendering it pervious.

When the substance of the spleen begins to be affected by that diseased action of which it is most susceptible, viz. an indolent swelling, which probably originates in a turgid or plethoric state of its bloodvessels, the arteries conveying to it more blood than the veins can carry off, the first sensation denoting the commencement of disease, is a *heaviness* in the left side, just below the margin of the ribs. This is the primary, and for sometime the only symptom, but it is uniformly present. At length this feeling of a weight within the abdomen, has superadded to it a pain more or less acute, which is increased by running or quick walking, and not unusually accompanied with a dry cough, and palpitation of the heart. The spirits flag, the strength fails, but though the appetite is keen and even immoderate, the digestive process cannot be performed. No pain is excited by pressure, for the affected part, being free from inflammation, possesses no tenderness.

However descriptive of this disease, the symptoms thus enumerated may appear, the discrimination of it is by no means certain, until the spleen has become so much enlarged in its size, that its bulk, and even its peculiar form can be ascertained by the hand.

If this disease, so obscurely developed by symptoms, should unfortunately pursue its course without being timelily detected, and successfully treated, dropsy will supervene, as the natural result of it; and, arising from such a cause, will rarely fail to prove fatal. Sometimes, however, the malady spontaneously takes a less unfavourable turn, and subsides by the unassisted efforts of the constitution. But, I am persuaded, that if it be discriminated at no great distance of time from its commencement, that a full course of the Tonic Aperient Spa at Daviesville, with its chalybeate impregnation, aided by a conformable regimen, and corroborated by deobstruent medicines, will contribute in an essential degree, to render pervious the obstructed bowels, and to disengage, and set at liberty the stagnant blood, with which its whole substance is choked, and engorged.

The other affections of the spleen, viz. inflammation of its membranes, or substance, terminating in the formation of matter, and ulcer; that degree of hardness which is called scirrhus, and that augmentation of its volume, which is termed sarcoma; these I purposely omit on account of the inapplicability of the spa in the treatment of them.

But there is an enlargement strongly resembling, and often mistaken for that of the spleen, which I cannot but advert to before I quit this subject, partly to guard the professional reader against the delusion which it causes, and partly because a full course of the spa can hardly fail to cure it. The flexure of the colon, which is near the spleen, is sometimes obstructed by indurated fœces and air, in such a degree, as to equal in magnitude the size of a large arm. Of this more than one instance has occurred in my practice at the Taunton Hospital.

Such an enlargement must, of course, be attended with uneasiness amounting to pain; and the practitioner, feeling, if not seeing the tumefaction, and considering the relative situation of the spleen, might readily be led to think the affection to be resident in that part, and to be of a formidable character. Whereas full purgation, by unloading the whole tract of the intestines, would speedily dissipate the malady.

Among the numerous species of disease by which the kidney is liable to be attacked, the only one which promises to be relieved by the mineral waters of Daviesville, is that which consists in an obstruction of its pelvis and ureter by calculi extremely minute, or sand, and even tenacious mucus.

Of this affection the most conclusive, and most frequent symptom is a fixed dull pain in the situation of the kidney, passing round the flank, and terminating where the ureter enters the bladder. The unnatural appearance of the urine, and the irritation to pass it often in very small quantities, are additional symptoms. It is unaccompanied by fever, which discriminates this from the inflammatory complaints by which the kidney is liable to be attacked.

This complaint, though certainly of more frequent occurrence in persons far advanced in life, and who, of course, are less susceptible of relief, whatever be the treatment, is occasionally met with in individuals of both sexes, not only below middle age, but even in youth. In patients such as these, the Tonic Aperient Spa, taken in small and often repeated quantities during the day, has been known to scour and cleanse the urinary passages, by greatly increasing the secretion and flow of urine, and thus not only to afford present relief, but by bracing, and giving tone to the vessels of the kidneys, guard them from a recurrence of the malady.

CHAPTER XII.

Of the various forms of disease to which the Sulphureous Spring is more particularly adapted.

By referring to the summary of the analysis of the Sulphureous Water, the scientific reader will readily see, that the ingredients in which its medicinal properties reside, are, though essentially different, fully equivalent to those which are possessed by the Tonic Aperient Spa.

In one respect at least, the spring now under our consideration, is of superior value, possessing, as it does, so large a proportion of the sulphate of soda, or Glauber's salt, of which the other is quite destitute. Another quality, varying this from the Tonic Aperient Spa, is the total apparent absence of carbonic acid in this, which is so exuberant in that. Of this deficiency the practical advantage is, that the Sulphureous Spring may be swallowed immediately from the pump, without exciting giddiness, headach, or any other inconvenience, of which some individuals have complained so much as to render necessary its exposure to the air, or transfusion from one vessel to another, to hasten the escape of the acid. Yet another difference is exhibited in the disproportion of the chalybeate impregnation, which in this spring is stated by the chemist to be no more than one-sixth of a grain in the imperial gallon, while in an imperial pint of the other, one grain and a quarter is present. Nor must it on any account be omitted, that the sulphureous principle, in some determinate form, exists in this water, and imparts to it a peculiarity of character and virtue not often met with in the cold mineral springs of this country.

From these considerations it is obvious, that the diseases to which the Sulphureous Spring is most appropriate, are those which require the action of the heart and arteries, instead of being excited, to be reduced, and in which all the secretions should be augmented; while, from the more penetrating influence of the saline and sulphureous ingredients, the fluids of the whole system are to be cleansed and purified, freed from their spissitude, and fitted to pervade the minutest structures.

These precise views show how applicable to constitutions tainted with scrofula, and to almost every species of cutaneous defedation the sulphureous spring is.

The rules for using it are rendered sufficiently obvious, by the directions which have been given for the use of the Tonic Aperient Spa. Further regulations must be taken from the difference of its effects, on the constitutions of different individuals. In fact, none but general rules can be furnished in a work of this kind. It may, however, not be superfluous, nor unacceptable, to add a remark or two not before made.

If in a cool state of the atmosphere the water be found to lie heavy on the stomach, or to chill the surface of the body, some spicy condiment, composition, or cordial should be taken with it. And this provision is of the greater expediency, as the salutary action of this particular spa is dependant on the facility with which it finds its way to the surface of the system, and the freedom with which it circulates there.

During its use, warm clothing will therefore be an indispensible adjunct; and the hands, as well as the feet, should be carefully protected from the variations of the weather.

Having thus introduced the subject of clothing, I may, with the greater propriety, make some remarks on the now general use of flannel, worn next the skin, as an article of dress, as physicians of eminence have differed much in their opinions respecting it.

They who are opposed to it argue, that there are no persons to whom it is so unsuitable as those for whom it is most frequently prescribed, namely, those who perspire too much; because its evident effect is to increase the insensible perspiration, and to relax the skin, by which the tenderness, numbness, and sensibility to cold are so much increased, as to show that it is prejudicial to them, and that its tendency is to make weakly people more weak.

They, on the other hand, who are advocates for the use of flannel and fleecy hosiery, worn next to the skin, and an accumulation of clothing, contend, that in affections of the chest, tending to consumption, these articles will be found to be productive of the best effects, by preventing too great a determination of blood to the lungs. They also insist, that in persons of delicate habits, having a susceptibility of being affected by colds and coughs, from variations in the temperature of the atmosphere, a protection is given against these attacks, by investing the chest in flannel.

These I conceive to be the main points relied on by each party respectively, in support of their opinions; and it cannot be denied that cases are in very frequent occurrence which confirm the accuracy of each. One of the opponents to the indiscriminate use of flannel in weakly persons, narrates the case of a consumptive lady, who was, he says, well able to walk about her house, when, by the advice of her physician, she put on a flannel shift, and in two days was confined to her bed for good, with no other evident cause than her taking to flannel. The same writer says, that he himself had been induced to wear flannel on account of a cough, and at first received some advantage, but after he had worn it a year or two, he found it prejudicial to his health. He became so tender as not to be able to endure the least cold; at length, in a hot season, he took to bathing, and left off his flannel with safety. He then found how much he had been disposed by the flannel to faintness. I knew a gentleman in a very delicate state of health, threatening consumption, who, from an accumulation of clothing, had made himself so susceptible of cold, or in other words so chilly, that he could not be comfortable in the morning, until he had taken twenty drops of laudanum. This, he said, produced a similar effect in warming him, to that of an upper coat.

On the other hand, an advocate for flannel states, very justly, that patients of a consumptive habit, who have had an attack of catarrh in the beginning of winter, are particularly liable to a return of the complaint during the continuance of the cold season, on the slightest occasion, and with greater violence. A relapse is, therefore, carefully to be guarded against, and nothing will be found to do this more effectually than the use of socks, and a flannel under-waistcoat, not to be left off till the approach of summer.

Now this, as it seems to me, is the *cardo rei*, the precise point to be settled; not whether flannel shall not be worn next to the skin, when existing circumstances, such as a disproportionate determination of blood to the lungs, a defect of the insensible perspiration, or a proneness to the attack of catarrh, require it; but whether, having been resorted to, it is at all events to be employed during the rest of life? I think not; and I rest my dissent on numerous cases, which have occurred to me in the course of my practice, and which have convinced me that it enfeebles the frame in delicate persons, especially during the summer months, and more particularly at night. I have, therefore, without hesitation, advised the discontinuance of it, and I never knew any harm to result. Some caution, however, is certainly necessary, unless summer be present, when there can be no hazard. At other times the cold shower, or plunging bath, or the use of the flesh brush will make it quite safe. Where any doubt exists, it may be prudent to proceed by degrees, to leave off the flannel at first by night, or to substitute calico for it.

If any state of the constitution requires the constant use of flannel next to the skin, it is that of weakness of the stomach and bowels, with a propensity to diarrhœa, from a suppression of the insensible perspiration on the surface of the body, and the transition of it to those passages.

CHAPTER XIII.

Of the Sulphureous Spring used as a Bath.

The Sulphureous Spring at Daviesville, in addition to its medical efficacy when received into the stomach, as an alterative, a diuretic, and a purgative spa, possesses this further advantage from its sulphureous principle, that, by having its temperature raised by artificial means, it may be beneficially applied to the surface of the body, for the relief of various glandular and cutaneous diseases, in a similar manner, and, it is hoped, with similar good effects to the more celebrated thermal springs on the continent.

This spring, if used at a temperature of from 65° to 85°, is called a cool, to distinguish it from a cold bath, which seldom rises to 65°, and that called the tepid bath, which is 90°. When the heat is raised to 95° or 98° it is called the warm, when it arrives at 100° the hot bath.

For every practical purpose, this temperature is as high as can be desired; and although the heat of the thermal spring at Carlsbad reaches 165°, and that of Aix la Chapelle 143°, while Bath is 114°, Buxton 82°, Bristol 74°, and Matlock 66°, it is clear that every desirable end is obtainable by the Sulphureous Bath at Daviesville; the heat of which may be so graduated, as to correspond with the highest and the lowest, or any intermediate temperature of the baths just enumerated. The Sulphureous Spring may also be used at any degree of heat as a shower bath, when this mode is preferred to immersion.

The cool bath is seldom employed medicinally, except by way of preparation for the use of the plunging bath. And in a delicate state of health, it is most prudent for the patient to begin with a warm bath, which may be taken every other day for two or three times, then as often with the tepid, and the cool bath. In using the cold bath, with a view to the amendment of the health when impaired, a single plunge only should be permitted.

Tepid bathing is extremely well adapted for cleansing the skin from peelings of the cuticle, forming branny scales, which are apt to adhere to the skin in persons of perfect health.

A warm bath at about 100° affords a most pleasing sensation to the individual, especially if the temperature of his body was previously lowered. Its tendency to reduce the pulse below the healthy standard, to make respiration more slow, and to cool the system, is remarkable; nor must its soothing and tranquillizing effects be omitted.

The hot bath is too powerfully stimulating to be used by invalids, and indeed cannot safely be used at all, except to detached portions of the body, as in paralytic cases, when the water is pumped on the affected limb. This is the practice at Bath, where it is called dry pumping, and is much in vogue.

In very obstinate cases of cutaneous affection, where the Sulphureous Spring seems to require an augmentation of its sulphureous principle, an addition may readily be made to it, which will equalize it in point of efficacy with the celebrated water of Barege. But in the majority of cases, the Sulphureous Spring will be self-sufficient for their cure.

CHAPTER XIV.

Miscellaneous Observations.

It was my desire and design to have closed these remarks on the Mineral Waters of Daviesville, by narrating such cases of their medical efficacy as might be conclusive to that end. I have reason to believe that many instances occurred during the last season, of individuals labouring under internal diseases, of an obscure kind, and obstinate character, who had failed to be relieved by the usual means, and were much benefitted by the waters. But as these patients were not under my care, and as I have no precise knowledge of the circumstances of the cases, I cannot take on myself the responsibility of vouching for them. Nor do I conceive that there is the least probability that I may hereafter acquire more knowledge on this subject than I already possess, for I find that persons in general who resort to places of this kind, seek no advice for the complaints, generally slight, which carry them there, but only for such as overtake them during their stay. For this reason, I entirely despair of seeing any reports of the effect of the waters which may be considered as authentic.

All that I have been able to gather by careful observation, I have communicated in the preceding chapters of this book, with a strong desire to promote the benevolent object of the patron of the waters, and the welfare of the individuals who may repair to them.

THE END.

George Awbrey, Printer, Fore Street, Bridgwater.

UNIVERSITY OF BRISTOL
MEDICAL
LIBRARY